

WEBSTER COUNTY



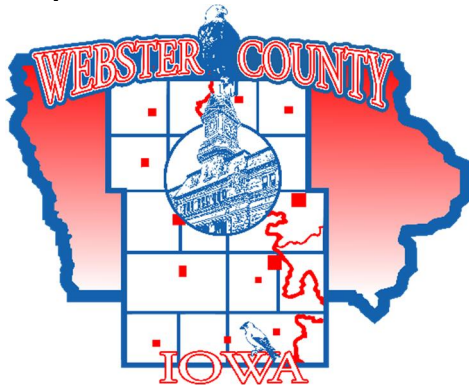
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Local Road Safety Plan



LOCAL ROAD SAFETY PLAN WEBSTER COUNTY

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WEBSTER COUNTY PLEDGE

In this pledge, I formalize Webster County's support for the goals in Iowa's 2019-2023 Strategic Highway Safety Plan (SHSP) and the overall vision of Zero Fatalities on Iowa's public roadways. Zero Fatalities is already the personal goal of every road user. Implementation of the safety strategies outlined in this Local Road Safety Plan (LRSP) will help road users keep that personal goal of staying safe while driving, walking, or riding on Webster County's roadways. Webster County has shown that dedication to proven safety programs and projects can reduce traffic fatalities and serious injuries. Webster County is committed to enhancing existing programs that work and implementing the safety strategies outlined in the LRSP to continue to drive down fatalities and serious injuries. In accordance with the LRSP, Webster County will continue to take the necessary steps to improve safety on the county's roadways in order to realize our goal of zero traffic fatalities by 2040.

Mark Campbell, Chair

Webster County Board of Supervisors

EXECUTIVE SUMMARY

In the United States over 37,000 people lost their lives in motor vehicle crashes in 2016. According to the Federal Highway Administration (FHWA), rural road safety is a concern because rural fatalities account for nearly half of all fatalities across the United States, yet less than 20% of the population lives in rural areas. In addition, the fatality rate on rural roads is 2.6 times higher than the fatality rate in urban areas.

“In 2015, 19% of the US population lived in rural areas but rural road fatalities accounted for 49% of all fatalities. Even with reductions in the number of fatalities on the roadways, the fatality rate in rural areas is 2.6 times higher than the fatality rate in urban areas.”

FHWA – Office of Traffic Safety

In Iowa, from 2007 to 2016 the fatal and serious injury crash rates on county roads were more than twice that of state-maintained roads. There was an average of 12.3 fatal and serious injury crashes per year on county roads in Webster County from 2007 to 2016, resulting in a county road fatal and serious injury crash rate of 9.46 crashes per hundred million vehicle miles traveled (HVMVT), almost twice that of the 5.16 statewide average fatal and serious injury crash rate over the same period.

In the past, many efforts have focused on safety for higher volume roads and reactionary or “black spot” analysis of high crash locations. However, there is a growing trend across the United States to focus on proactive safety improvements for rural roads.

The Iowa Department of Transportation (DOT) developed a Strategic Highway Safety Plan (SHSP) to provide technical assistance in prioritization and deployment of safety countermeasures within various jurisdictions throughout the state. The Local Road Safety Plan (LRSP) concept is designed to build on the foundation established by the SHSP. The LRSP provides the basis for proactive implementation of safety countermeasures specific to individual counties across Iowa. This allows the county to leverage the road safety planning process to meet county-specific needs.

E.1. What is an LRSP?

An LRSP is a document that provides a basis for systemic safety improvements along local roads. Rather than addressing “black spots,” the LRSP identifies systemic safety improvements along the roadway based on a risk factor analysis of the roadway. LRSPs not only assist local practitioners in understanding the types of crashes occurring on local roadways, but they also define a locally focused plan for practitioners to make informed, prioritized safety decisions. Additional benefits of LRSPs include:

- Coordination between various agencies within the county
- Use of the results of the analysis to leverage and apply for funding
- Focus on all the five E’s of safety (Engineering, Emergency response, Education, Enforcement, and Everyone)

The LRSP process has been successfully initiated in several states including Minnesota, North Dakota, and Kansas.



E.1.1. Five E's of Safety

In some states, LRSPs generally focus on engineering improvements to mitigate crashes at the county level. In Iowa, LRSPs are also assessing what is being conducted at the county level to address all of the five E's of safety.

While engineering improvements can make the roadways safer, engineering improvements alone cannot prevent all motor vehicle crashes. According to the National Highway Traffic Safety Administration (NHTSA), over 90% of all crashes are the result of driver-related factors. Because such a high percentage of crashes are a result of driver-related factors, making roadways safer requires all of the five E's to be involved.



Working together with all of the E's at the county level will help make the county roads safer.

E.2. Purpose of the LRSP

The LRSP identifies a prioritized list of safety improvement projects that can be implemented within the county to address specific crash characteristics identified during the data collection portion of the project. The recommendations in this plan focus on transportation improvements with a high benefit of crash reductions by applying the principles established in the SHSP and through a systemic data analysis performed specifically for Webster County. The recommended improvements take into consideration constraints within the local county network and incorporate feedback from the County Engineer and local stakeholders.

Phase 1 of the LRSP project was completed in March 2016, which included 12 Iowa counties throughout the state, two from each Iowa DOT District. Phase 2 of the project concluded in November 2017 and included 17 additional counties in the southeast part of the state.

Webster County is part of the third phase of the project which includes 18 counties, located throughout the state. The following counties are included within Phase 3 of the Iowa DOT LRSP project.

- | | |
|--------------------|-------------------------|
| ▪ Adair County | ▪ Fremont County |
| ▪ Allamakee County | ▪ Howard County |
| ▪ Appanoose County | ▪ Kossuth County |
| ▪ Boone County | ▪ Linn County |
| ▪ Butler County | ▪ Lyon County |
| ▪ Cherokee County | ▪ Osceola County |
| ▪ Crawford County | ▪ Pocahontas County |
| ▪ Fayette County | ▪ Pottawattamie County |
| ▪ Franklin County | ▪ Webster County |

Figure E-1 illustrates the counties completed in Phase 1 and Phase 2 as well as those included in Phase 3 with respect to the state of Iowa.

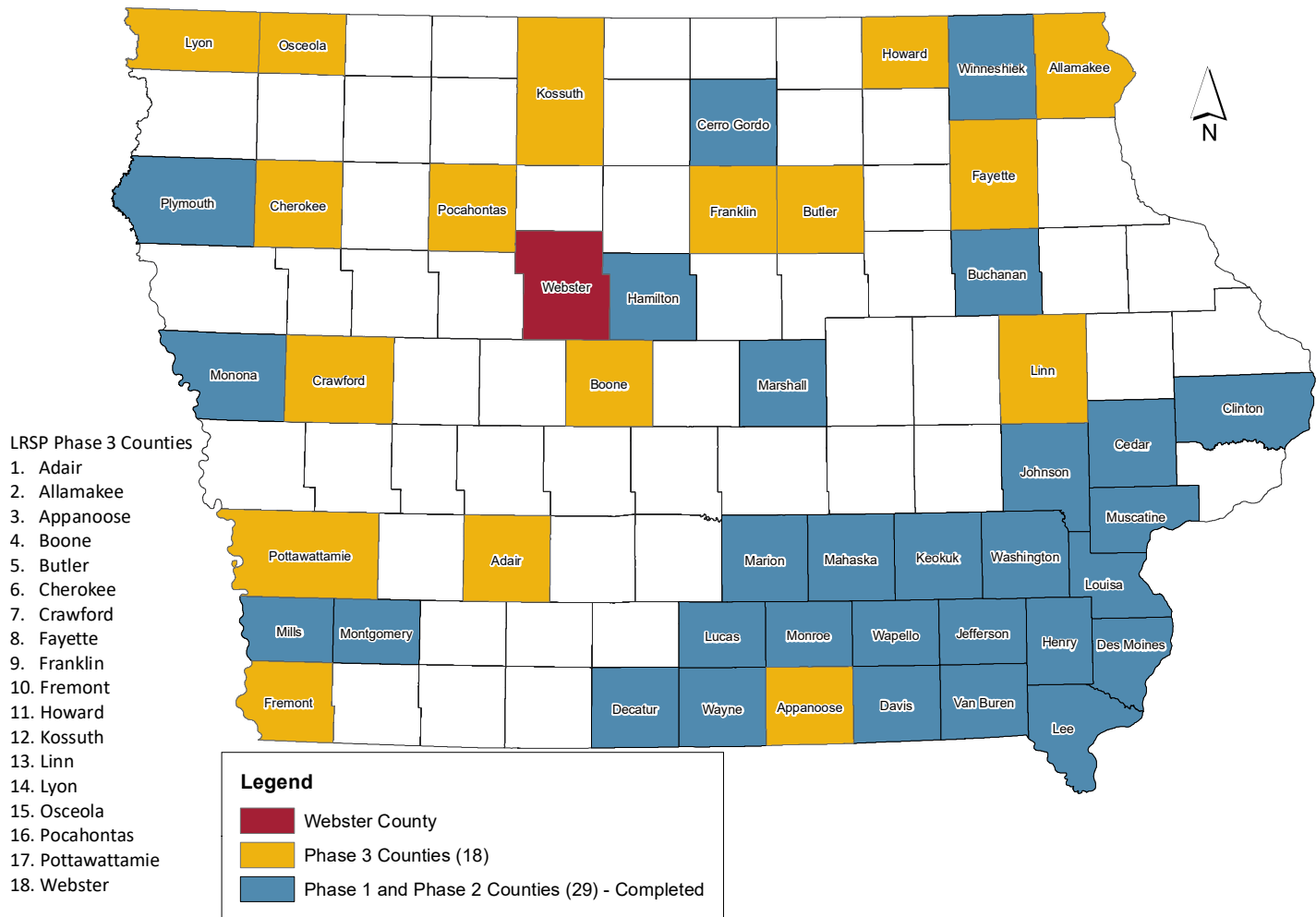


Figure E-1 – Location of LRSP Counties with Respect to Iowa

E.3. Webster County

Webster County is located in central Iowa and was named after Daniel Webster, a politician who served in the United States House of Representatives twice. According to the 2010 census, the population of Webster County is 38,013. Fort Dodge, the county seat, is also the county's most populous city with a population of 25,206.

The county maintains approximately 1,180 miles of county roads, of which approximately 305 are paved. From 2007 to 2016 there were 1,785 crashes on Webster County roads, of which 123 crashes resulted in fatal and serious injuries.

E.4. LRSP Project Overview

The LRSP project includes seven primary task assignments. The following is a brief description of the tasks associated with this project, with a more detailed description of each task in subsequent sections of this document. **Figure E-2** illustrates the LRSP project process and timeline.



E.4.1. Gather Background Information

Under this task, relevant documents provided by the counties were reviewed as well as the Iowa SHSP, and potential funding sources. Data requests were made of the counties to provide the location and presence of rumble strips, destination lighting, stop signs, and other pertinent safety improvements.

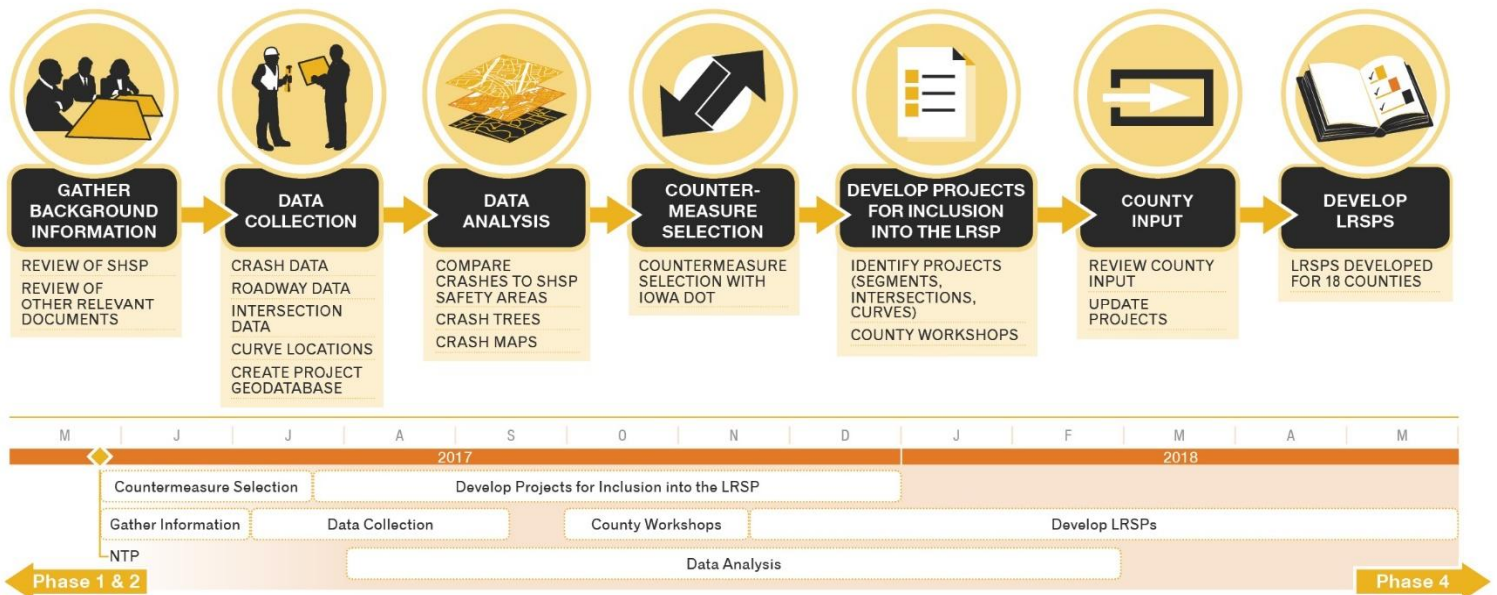


Figure E-2 – LRSP Project Process

E.4.2. Data Collection

A comprehensive Geographic Information System (GIS) project database was developed utilizing the following databases as provided by the Iowa DOT, the county, or collected as part of this project:

- Crash database
- Roadway database
- Access point database (911 address database)
- Pavement management database
- Roadside hazard database
- Horizontal curve database
- County stop sign database
- Intersection database

E.4.3. Data Analysis

After development of the comprehensive GIS project database, the crash data was analyzed for Webster County. Crashes were compared to the Safety Emphasis Areas for the State of Iowa (as defined in the SHSP) and crash trees and maps were prepared. Relevant information from the crash data analysis is included within this document.



E.4.4. Countermeasure Selection

In coordination with the Iowa DOT, a list of low-cost engineering-related safety countermeasures was developed for use as recommendations in the LRSP project. These countermeasures are discussed in **Section 5** of this report.

In addition, a workshop was held with the safety stakeholders of Webster County. Prior to the workshop, a list of safety topics was developed and distributed to the county to foster discussion at the workshop on driver-related safety countermeasure implementation. During this workshop, the following items were discussed:

- The background and purpose of the LRSP
- The five E's of safety
- Crash data
- Driver-related countermeasures

Driver-related countermeasures were reviewed and stakeholders discussed existing and proposed driver-related countermeasures. A summary of the countermeasures currently underway in the county, as well as those proposed at the workshop, are included within this document.

E.4.5. Develop Projects for Inclusion into the LRSP

A risk factor ranking process was developed for segments, intersections, and curves. Risk factors were calculated for all paved segments, intersections, and curves within the county. Risk factors included roadway features such as curve radius, shoulder width, and traffic volumes. After conducting the risk factor analysis, recommended safety improvements were developed for the feature types based on the project selection decision trees. Improvements included items such as additional signage, pavement markings, and rumble strips. Project sheets detailing the recommended safety improvements at specific locations were then provided to the County Engineer for review.

E.4.6. County Input

As the systemic analysis was based solely upon available GIS data, the associated recommended countermeasures did not incorporate data regarding geometrics, turning movements, right-of-way, etc. Additional safety countermeasures could be applied at locations that were determined to have a high risk factor ranking, but may require additional site-specific information that may be known by the County Engineer. The project sheets, recommending countermeasures as determined by the project selection decision trees, were provided to the County Engineer for input for additional safety countermeasures. This step allowed the County Engineer to use engineering judgment and site-specific knowledge to recommend additional safety countermeasures at the identified/prioritized locations. At the county workshop, the project sheets and recommendations were reviewed.

E.4.7. Develop LRSPs

An LRSP was developed for the county including a summary of the LRSP process along with recommended safety projects for implementation by the county.

E.5. Recommendations

This LRSP identifies both driver- and engineering-related countermeasures. The following sections summarize the recommended countermeasures and improvements for the county.

E.5.1. Driver-Related Countermeasures

The 2013 Iowa SHSP has ten Key Safety Emphasis Areas, of which six are driver-related emphasis areas:

- Speed-related
- Unprotected persons
- Younger drivers
- Impaired driving
- Older drivers
- Inattentive/distracted driving

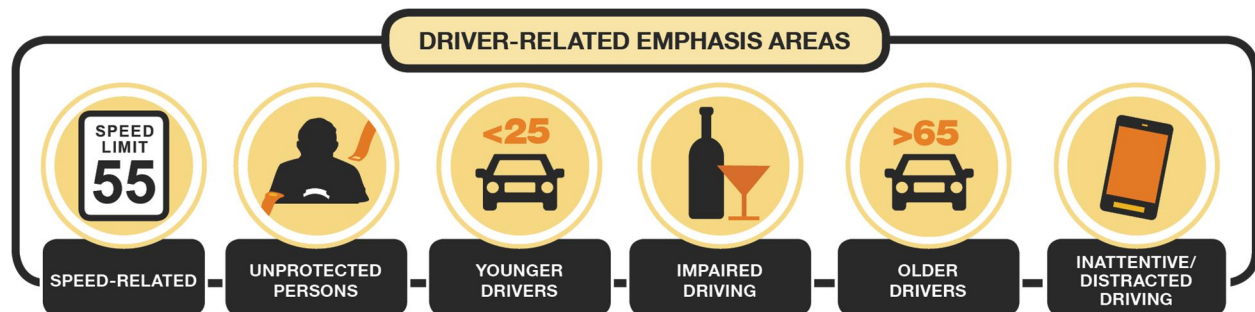


Figure E-3 – Iowa SHSP Driver-Related Emphasis Areas

During the workshop, attendees were provided information regarding fatal and serious injury crashes within the county and how that data aligned with the Iowa SHSP Key Safety Emphasis Areas. Potential countermeasures from the *National Cooperative Highway Research Program (NCHRP) Report 500 Series, Toward Zero Deaths* documents, and the results from Phase 1 and 2 of the LRSPs were provided to stakeholders to facilitate discussion on what action items were currently underway in the county with respect to driver-related crashes. The following statuses of implementation for the various driver-related countermeasures were defined based on the results of the discussion at the county workshop:

- Underway/Ongoing (currently being done);
- Area for Improvement (ongoing, but could be enhanced);
- Opportunity (not being done, but could be implemented); or
- Completed in the Past (has been completed in the past, but not planned to be implemented in the future).

Table E-1 provides a summary of the status of implementation of the driver-related countermeasures within Webster County. It is recommended that the county continue to implement countermeasures that are currently underway/ongoing, and look for opportunities to implement additional countermeasures not currently being implemented. This will require input from and coordination with all of the five E's of safety. **Section 5.5** provides details on the implementation of the following countermeasures.



Table E-1 – County Driver-Related Countermeasure Summary

Countermeasure	Status
Speed-Related	
Conduct targeted speed enforcement	Opportunity
Prosecute and impose sanctions on drivers not obeying school bus stop bars	Opportunity
Conduct education and awareness campaigns	Opportunity
Unprotected Persons	
Conduct targeted enforcement of restraint use	Area for Improvement
Instruction in proper child restraint use	Underway/Ongoing
Check for proper child restraint use in all motorist encounters	Underway/Ongoing
Positive Reinforcement	Underway/Ongoing
Conduct education and awareness campaigns	Opportunity
Younger Drivers	
Enforcement of graduated driver's license laws	Underway/Ongoing
Mock prom disaster events	Completed in the Past
Additional training in schools	Opportunity
Conduct education and awareness campaigns	Opportunity
Impaired Driving	
Conduct targeted OWI enforcement	Underway/Ongoing
Conduct safety checkpoints	Opportunity
Compliance checks for alcohol sales	Underway/Ongoing, Opportunity
Alternative transportation choices	Underway/Ongoing
Prosecute, impose sanctions on, and treat OWI offenders	Area for Improvement
Conduct education and awareness campaigns	Opportunity
Older Drivers	
Promote safe mobility choices	Opportunity
Encourage external reporting of at-risk drivers to licensing authorities	Underway/Ongoing
Conduct education and awareness campaigns	Opportunity
Inattentive/Distracted Driving	
Visibly enforce existing statutes to deter distracted driving	Opportunity
Agency policy for hands-free devices	Opportunity
Mobile simulator for distracted driving	Underway/Ongoing
Conduct education and awareness campaigns	Opportunity



E.5.2. Engineering Countermeasures

In addition to driver-related countermeasures, a list of safety engineering projects was developed for locations with high risk factor rankings along county paved roads. Projects were developed for high-priority county paved segments, intersections, and curves. Segment and curve projects included improvements such as enhanced signing and striping, rumble strips, and shoulders with safety edges. Intersection projects included improvements such as destination lighting, upgrading signs and pavement markings, and transverse rumble strips on stop-controlled approaches. **Table E-2** provides a consolidated cost summary of the recommended safety improvements developed for the county. **Section 6** of the LRSP and the **Appendices** include detailed project information.

Table E-2 – Engineering Countermeasures Cost Summary

Facility Type	Number of Locations	Estimated Project Cost
Segments	15	\$3,563,000
Intersections	14	\$637,000
Curves	10	\$301,000
Total Improvement Costs	39	\$4,501,000

Due to the limited amount of available data, low traffic volumes, and limitations on the types of safety improvement projects that can be implemented on unpaved roads, location-specific recommendations were not developed for unpaved roadways. However, this LRSP includes safety recommendations that can be considered for implementation on the unpaved roadway system by the County Engineer.

E.6. Implementation

One of the goals of the LRSP project is to provide a document that is usable and can be frequently consulted by the County Engineer to aid in requesting funding and in the completion of traffic safety improvement projects on county-maintained roads. This section describes some recommendations on how this plan can be implemented within the county.

The project sheets developed and provided in **Appendix B2**, **Appendix C2**, and **Appendix D2** are intended to be used as a straightforward way to apply for safety improvement funding through the Highway Safety Improvement Program for Secondary Roads (HSIP-S). The recommendations contained within the project sheets lend themselves well to HSIP-S funding because they were developed based on a proactive risk factor assessment, with a focus on reducing the potential for fatal and serious injury crashes.

Additionally, there is a list of high-crash locations contained within **Section 7** of this document. It is recommended that the County Engineer consider applying for Traffic Safety Improvement Program (TSIP) funding at these locations because TSIP funding considers benefit-cost analysis. The County Engineer can review these locations to determine if safety improvements, similar to the ones outlined within **Section 6.2**, **Section 6.3**, and **Section 6.4** are applicable, and develop a TSIP application based on the recommended improvements.

The County Engineer should also review the projects within the Five-Year Program and consider including safety recommendations from the project sheets into those projects, where applicable.



In future cycles of the Five-Year Program, it is recommended that the safety projects included on the project sheets be considered for inclusion in the program.

The County Engineer should also consider consulting the LRSP when developing a project for design or addressing a maintenance issue, in order to incorporate the types of safety improvement recommendations in the LRSP and in the project sheets. Doing so can help prioritize projects and emphasize safety in design and maintenance.

Finally, the LRSP can be consulted during routine maintenance activities such as striping and mowing (clearing and grubbing). The document can be used to provide instruction or education to maintenance crews about the safety implications of their work.

E.7. Next Steps

Project sheets containing the prioritized list of projects have been provided in **Appendix B2**, **Appendix C2**, and **Appendix D2** to aid the County Engineer in obtaining funding for safety improvements and/or for incorporating recommendations into planned roadway improvement projects. These sheets may require updating for funding applications in future years. The County Engineer may also make changes to the prepared project sheets based on local knowledge of the site, available funding, and/or specific needs.

It is recommended that the county continue to foster cooperation with other stakeholders and look for opportunities to improve and expand implementation of driver-related countermeasures. The county should continue its history of implementing a number of safety improvement projects annually. Based on current funding levels, it is anticipated that many of the engineering improvements listed in this plan could be implemented within five to ten years, or sooner. Additionally, this LRSP should be updated within five to ten years to reflect improvements that have been implemented, additional availability of roadway feature data, and changes in crash types and patterns.

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LIST OF ABBREVIATIONS

A	Serious Injury
AASHTO	American Association of State Highway and Transportation Officials
ADT	Average Daily Traffic
ARIDE	Advanced Roadside Impaired Driving Enforcement
Caltrans	California Department of Transportation
CMF	Crash Modification Factor
CPST	Child Passenger Safety Technician
CRF	Crash Reduction Factor
C-STEP	County-State Traffic Engineering Program
DARE	Drug Abuse Resistance Education
DEV	Daily Entering Vehicles
DOT	Department of Transportation
DRE	Drug Recognition Expert
EMS	Emergency Medical Services
FHWA	Federal Highway Administration
Five E's	Engineering, Emergency response, Education, Enforcement, and Everyone
FTYROW	Failure to Yield Right-of-Way
GIMS	Geographic Information Management System
GIS	Geographic Information System
GTSB	Governor's Traffic Safety Bureau
HFST	High Friction Surface Treatment
HPS	High Pressure Sodium
HSIP-S	Highway Safety Improvement Program – Secondary
HSM	Highway Safety Manual
HMVMT	Hundred Million Vehicle Miles Traveled
ICE	Intersection Configuration Evaluation
ICWS	Intersection Conflict Warning System
InTrans	Institute for Transportation at Iowa State University
IRI	International Roughness Index
ITSDS	Iowa Traffic Safety Data Service
K	Fatality
LED	Light Emitting Diode
LRSP	Local Road Safety Plan
LRTF	Living Roadway Trust Fund
LTAP	Local Technical Assistance Program
MDST	Multi-Disciplinary Safety Team
MnDOT	Minnesota Department of Transportation
mph	miles per hour



MUTCD	Manual on Uniform Traffic Control Devices
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
OWI	Operating While Intoxicated
RSA	Road Safety Assessment
SALT	Seniors and Law Enforcement Together
SEO	Safety Education Officer
SHSP	Strategic Highway Safety Plan
SICL	Safety Improvement Candidate Location
SRPFCC	Sign Replacement Program for Cities and Counties
sSTEP	Special Traffic Enforcement Program
SUDAS	Statewide Urban Design and Specifications
TEAP	Traffic Engineering Assistance Program
TSIP	Traffic Safety Improvement Program
usRAP	United States Road Assessment Program
VMT	Vehicle Miles Traveled

1. INTRODUCTION

In the United States over 37,000 people lost their lives in motor vehicle crashes in 2016. According to the Federal Highway Administration (FHWA), rural road safety is a concern because rural fatalities account for nearly half of all fatalities across the United States, yet less than 20% of the population lives in rural areas. In addition, the fatality rate on rural roads is 2.6 times higher than the fatality rate in urban areas.

“In 2015, 19% of the US population lived in rural areas but rural road fatalities accounted for 49% of all fatalities. Even with reductions in the number of fatalities on the roadways, the fatality rate in rural areas is 2.6 times higher than the fatality rate in urban areas.”

FHWA – Office of Traffic Safety

In Iowa, from 2007 to 2016 the fatal and serious injury crash rates on county roads were more than twice that of state-maintained roads. There was an average of 12.3 fatal and serious injury crashes per year on county roads in Webster County from 2007 to 2016, resulting in a county road fatal and serious injury crash rate of 9.46 crashes per hundred million vehicle miles traveled (HVMVT), almost twice that of the 5.16 statewide average fatal and serious injury crash rate over the same period.

In the past, many efforts have focused on safety for higher volume roads and reactionary or “black spot” analysis of high crash locations. However, there is a growing trend across the United States to focus on proactive safety improvements for rural roads.

The Iowa Department of Transportation (DOT) developed a Strategic Highway Safety Plan (SHSP) to provide technical assistance in prioritization and deployment of safety countermeasures within various jurisdictions throughout the state. The Local Road Safety Plan (LRSP) concept is designed to build on the foundation established by the SHSP. The LRSP provides the basis for proactive implementation of safety countermeasures specific to individual counties across Iowa. This allows the county to leverage the road safety planning process to meet county-specific needs.

1.1. What is an LRSP?

An LRSP is a document that provides a basis for systemic safety improvements along local roads. Rather than addressing “black spots,” the LRSP identifies systemic safety improvements along the roadway based on a risk factor analysis of the roadway. LRSPs not only assist local practitioners in understanding the types of crashes occurring on local roadways, but they also define a locally focused plan for practitioners to make informed, prioritized safety decisions. Additional benefits of LRSPs include:

- Coordination between various agencies within the county
- Use of the results of the analysis to leverage and apply for funding
- Focus on all the five E’s of safety (Engineering, Emergency response, Education, Enforcement, and Everyone)

The LRSP process has been successfully initiated in several states including Minnesota, North Dakota, and Kansas.



1.1.1. Five E's of Safety

In some states, LRSPs generally focus on engineering improvements to mitigate crashes at the county level. In Iowa, LRSPs are also assessing what is being conducted at the county level to address all of the five E's of safety.

While engineering improvements can make the roadways safer, engineering improvements alone cannot prevent all motor vehicle crashes. According to the National Highway Traffic Safety Administration (NHTSA), over 90% of all crashes are the result of driver-related factors. Because such a high percentage of crashes are a result of driver-related factors, making roadways safer requires all of the five E's to be involved.



Working together with all of the E's at the county level will help make the county roads safer.

E.8. Purpose of the LRSP

The LRSP identifies a prioritized list of safety improvement projects that can be implemented within the county to address specific crash characteristics identified during the data collection portion of the project. The recommendations in this plan focus on transportation improvements with a high benefit of crash reductions by applying the principles established in the SHSP and through a systemic data analysis performed specifically for Webster County. The recommended improvements take into consideration constraints within the local county network and incorporate feedback from the County Engineer and local stakeholders.

Phase 1 of the LRSP project was completed in March 2016, which included 12 Iowa counties throughout the state, two from each Iowa DOT District. Phase 2 of the project concluded in November 2017 and included 17 additional counties in the southeast part of the state.

Webster County is part of the third phase of the project which includes 18 counties, located throughout the state. The following counties are included within Phase 3 of the Iowa DOT LRSP project.

- | | |
|--------------------|-------------------------|
| ▪ Adair County | ▪ Fremont County |
| ▪ Allamakee County | ▪ Howard County |
| ▪ Appanoose County | ▪ Kossuth County |
| ▪ Boone County | ▪ Linn County |
| ▪ Butler County | ▪ Lyon County |
| ▪ Cherokee County | ▪ Osceola County |
| ▪ Crawford County | ▪ Pocahontas County |
| ▪ Fayette County | ▪ Pottawattamie County |
| ▪ Franklin County | ▪ Webster County |

Figure 1 illustrates the counties completed in Phase 1 and Phase 2 as well as those included in Phase 3 with respect to the state of Iowa.

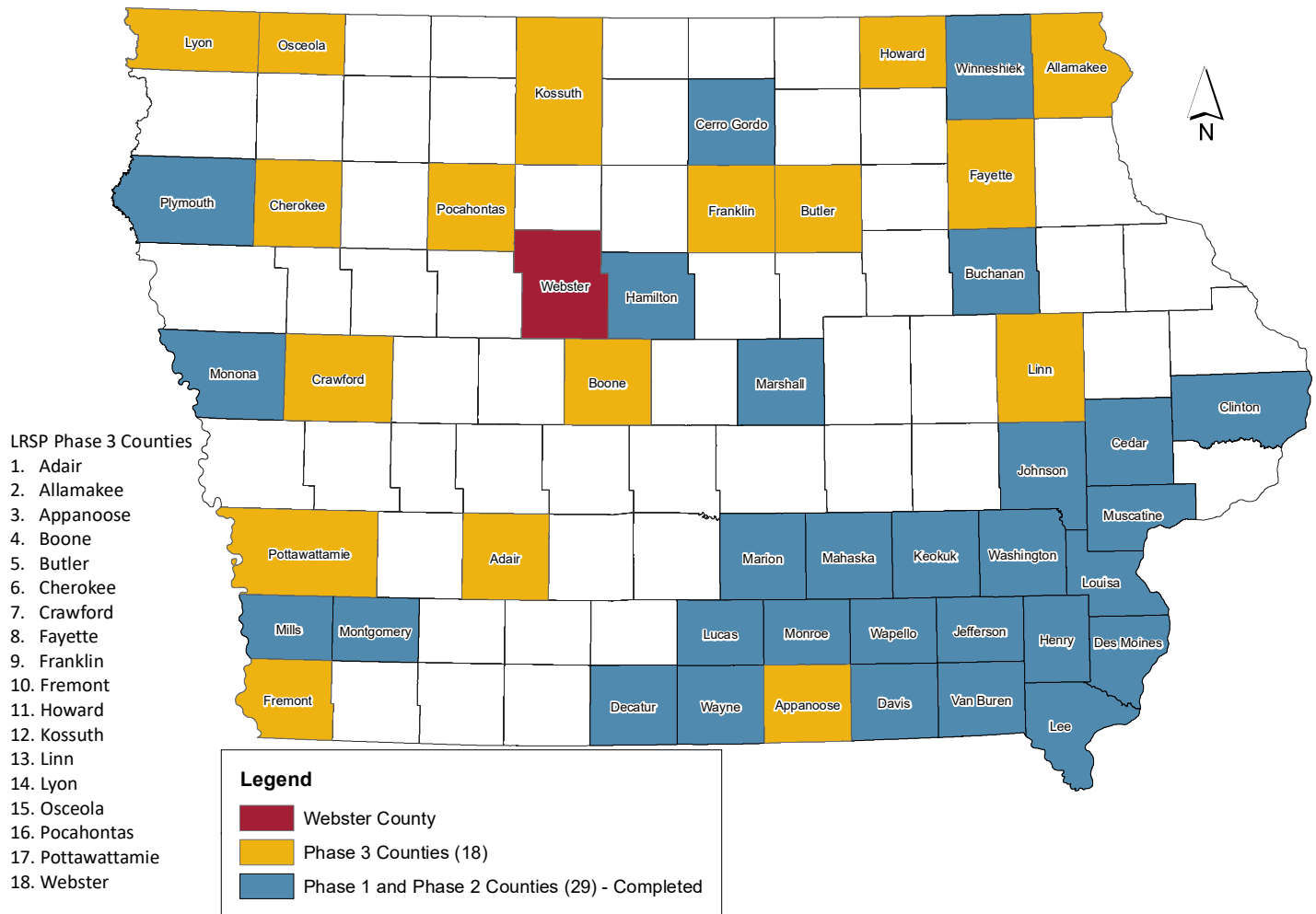


Figure 1 – Location of LRSP Counties with Respect to Iowa

1.2. Webster County

Webster County is located in central Iowa and was named after Daniel Webster, a politician who served in the United States House of Representatives twice. According to the 2010 census, the population of Webster County is 38,013. Fort Dodge, the county seat, is also the county's most populous city with a population of 25,206.

The county maintains approximately 1,180 miles of county roads, of which approximately 305 are paved. From 2007 to 2016 there were 1,785 crashes on Webster County roads, of which 123 crashes resulted in fatal and serious injuries.

1.3. LRSP Project Overview

The LRSP project includes seven primary task assignments. The following is a brief description of the tasks associated with this project, with a more detailed description of each task in subsequent sections of this document. **Figure 2** illustrates the LRSP project process and timeline.



1.3.1. Gather Background Information

Under this task, relevant documents provided by the counties were reviewed as well as the Iowa SHSP, and potential funding sources. Data requests were made of the counties to provide the location and presence of rumble strips, destination lighting, stop signs, and other pertinent safety improvements.

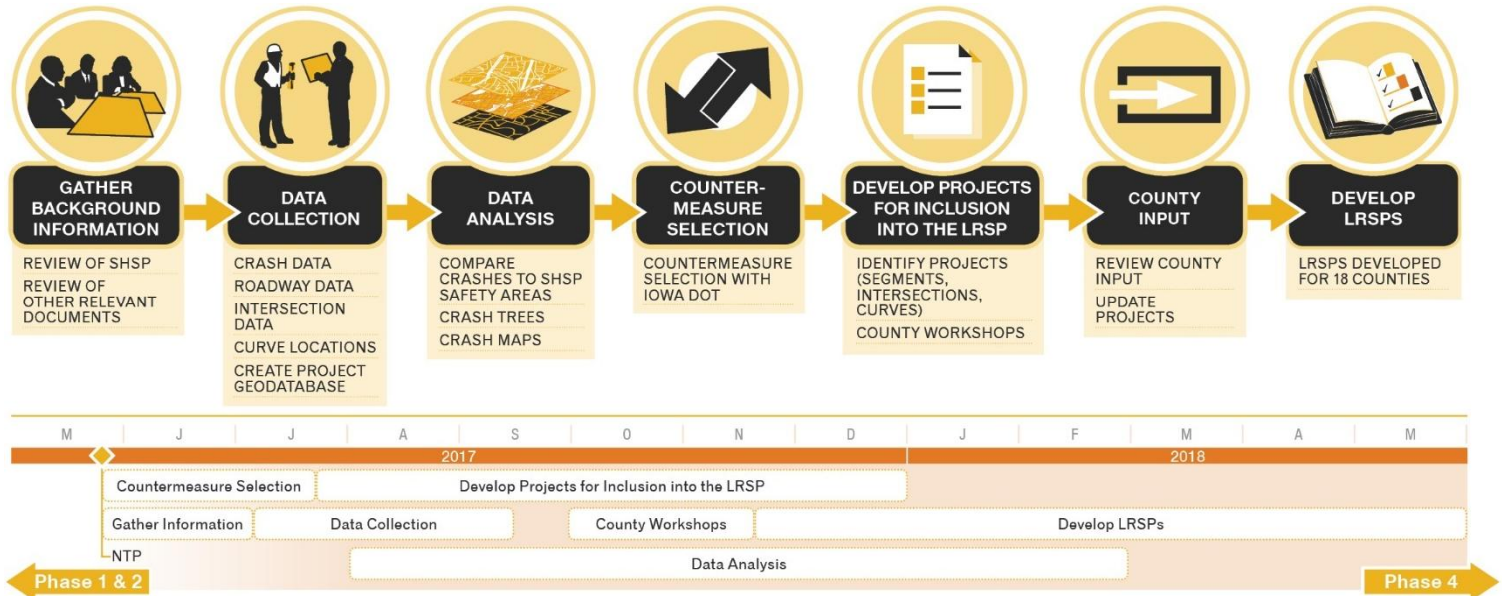


Figure 2 – LRSP Project Process

1.3.2. Data Collection

A comprehensive Geographic Information System (GIS) project database was developed utilizing the following databases as provided by the Iowa DOT, the county, or collected as part of this project:

- Crash database
- Roadway database
- Access point database (911 address database)
- Pavement management database
- Roadside hazard database
- Horizontal curve database
- County stop sign database
- Intersection database

1.3.3. Data Analysis

After development of the comprehensive GIS project database, the crash data was analyzed for Webster County. Crashes were compared to the Safety Emphasis Areas for the State of Iowa (as defined in the SHSP) and crash trees and maps were prepared. Relevant information from the crash data analysis is included within this document.



1.3.4. Countermeasure Selection

In coordination with the Iowa DOT, a list of low-cost engineering-related safety countermeasures was developed for use as recommendations in the LRSP project. These countermeasures are discussed in **Section 5** of this report.

In addition, a workshop was held with the safety stakeholders of Webster County. Prior to the workshop, a list of safety topics was developed and distributed to the county to foster discussion at the workshop on driver-related safety countermeasure implementation. During this workshop, the following items were discussed:

- The background and purpose of the LRSP
- The five E's of safety
- Crash data
- Driver-related countermeasures

Driver-related countermeasures were reviewed and stakeholders discussed existing and proposed driver-related countermeasures. A summary of the countermeasures currently underway in the county, as well as those proposed at the workshop, are included within this document.

1.3.5. Develop Projects for Inclusion into the LRSP

A risk factor ranking process was developed for segments, intersections, and curves. Risk factors were calculated for all paved segments, intersections, and curves and within the county. Risk factors included roadway features such as curve radius, shoulder width, and traffic volumes. After conducting the risk factor analysis, recommended safety improvements were developed for the feature types based on the project selection decision trees. Improvements included items such as additional signage, pavement markings, and rumble strips. Project sheets detailing the recommended safety improvements at specific locations were then provided to the County Engineer for review.

1.3.6. County Input

As the systemic analysis was based solely upon available GIS data, the associated recommended countermeasures did not incorporate data regarding geometrics, turning movements, right-of-way, etc. Additional safety countermeasures could be applied at locations that were determined to have a high risk factor ranking, but may require additional site-specific information that may be known by the County Engineer. The project sheets, recommending countermeasures as determined by the project selection decision trees, were provided to the County Engineer for input for additional safety countermeasures. This step allowed the County Engineer to use engineering judgment and site-specific knowledge to recommend additional safety countermeasures at the identified/prioritized locations. At the county workshop, the project sheets and recommendations were reviewed.

1.3.7. Develop LRSPs

An LRSP was developed for the county including a summary of the LRSP process along with recommended safety projects for implementation by the county.



1.4. Document Organization

This document is organized into the following sections:

- **Section 1** presents the project background and purpose of the LRSP.
- **Section 2** provides a summary of relevant information reviewed as part of the study.
- **Section 3** summarizes the data collected and geodatabase developed for the analysis.
- **Section 4** describes the county crash data analysis.
- **Section 5** provides a summary of potential countermeasures and a summary of the driver-related countermeasure selection portion of the workshop.
- **Section 6** describes the methodology for project selection and safety improvement recommendations and provides a summary of the project selection portion of the workshop.
- **Section 7** includes a list of high crash segments, intersections, and curves for reference.
- **Section 8** provides a summary of the LRSP recommendations.
- **Appendices** include detailed county project sheets for paved segments, intersections, and curves as well as summary sheets including all locations that were analyzed as part of this LRSP.



2. BACKGROUND

Under this task, relevant documents were reviewed including the Iowa SHSP, funding sources, and other documents provided by the county. The following subsections summarize the background information that was gathered and reviewed as part of the LRSP.

2.1. Iowa SHSP

At the beginning of the LRSP project, the most current Iowa SHSP was the 2013 SHSP, which was in effect until December 31, 2016. The Iowa DOT has since published the 2017 SHSP, documenting progress in transportation safety and identifying older drivers and motorcycle-related severe injuries as rising trends. As part of the 2017 Iowa SHSP, five years of crash data for crashes resulting in fatalities and serious injuries were separated into 17 safety emphasis areas, which are generally defined by the American Association of State Highway and Transportation Officials (AASHTO) SHSP. This process determined the safety emphasis areas with the greatest number of crashes within Iowa, and resulted in the focused opportunities for safety improvements on Iowa roadways.

There are 10 Key Safety Emphasis Areas that were determined by a data-driven process that took into account fatal and serious injury crashes by emphasis area, but also investigated trends within the emphasis areas. Identifying safety emphasis areas allows stakeholders to develop and prioritize strategies that can reduce fatal and serious injury crashes on Iowa roadways. Eight of the Key Safety Emphasis Areas which were defined in the 2013 SHSP are also presented in the 2017 SHSP. Two additional Key Safety Emphasis Areas were noted: Roadside Collisions and Motorcycles. The Key Safety Emphasis Areas can be broken down into two categories: driver-related and roadway/infrastructure. Following is a summary of the 10 Key Safety Emphasis Areas for Iowa based on crash data from 2010 - 2014:



- Driver-Related
 - Speed-related (49% of fatal and serious injury crashes)
 - Unprotected persons (37% of fatal and serious injury crashes)
 - Younger drivers (35% of fatal and serious injury crashes)
 - Impaired driving (20% of fatal and serious injury crashes)
 - Older drivers (18% of fatal and serious injury crashes)
 - Motorcycles (16% of fatal and serious injury crashes)
- Roadway/Infrastructure
 - Lane departure (54% of fatal and serious injury crashes)
 - Local roads (53% of fatal and serious injury crashes)
 - Intersections (30% of fatal and serious injury crashes)
 - Roadside collisions (34% of fatal and serious injury crashes)



As reported in the 2017 SHSP, the goal to reduce fatalities by 15% on Iowa's roadways by the year 2020, was achieved in 2015. Also, as of 2015, the goal to reduce serious injuries by 15% by 2020 was on track. The 2017 SHSP established two new goals to achieve by 2020:

- Reduce fatality rate to 1.0 per HMVMT
- Reduce serious injury rate to 4.3 per HMVMT

The Iowa SHSP identifies five basic components essential to meeting the goal:

- Education
- Enforcement
- Engineering
- Policy
- Data management and use

By focusing on all of these components, Iowa believes it is possible to achieve the improved safety goal set forth in the SHSP.

2.2. Iowa DOT Safety Programs

There are a wide variety of transportation safety funding sources available to counties within the State of Iowa. These funding programs can be used to implement treatments and recommendations for roadways and locations identified for improvements as part of this LRSP. The following Iowa DOT safety programs are available for the county to apply for funding to aid in implementation of the safety countermeasures identified within this LRSP.

- County-State Traffic Engineering Program (C-STEP)
http://www.iowadot.gov/pol_leg_services/Funding-Guide.pdf
- Highway Safety Improvement Program – Secondary (HSIP-S)
<http://www.iowadot.gov/traffic/sections/HSIP.html>
- Sign Replacement Program for Cities and Counties (SRPFCC)
<http://www.iowadot.gov/traffic/signreplacementprogram.htm>
- Traffic Engineering Assistance Program (TEAP)
<http://www.iowadot.gov/traffic/teap.html>
- Traffic Safety Improvement Program (TSIP)
<https://iowadot.gov/traffic/traffic-and-safety-programs/tsip/tsip-program>

2.3. Other Safety Funding Opportunities and Resources

This section describes various transportation safety funding opportunities and resources that are available for counties to improve safety on their roadways. It is recommended that the County Engineer review these resources and find programs or resources that are valuable and could be applied within the county.

2.3.1. Iowa DOT Resources

2.3.1.1. Zero Fatalities

The Iowa DOT, the Department of Public Health, and the Department of Public Safety have committed to the ultimate goal of zero fatalities and have teamed up to provide safety information, answers to frequently asked safety questions, general crash statistics, and marketing materials at <http://ia.zerofatalities.com/>.

2.3.1.2. Crash Maps

The Iowa DOT has a crash mapping website, which can be used to develop crash maps and data to compare crash history within a county. Crash maps can be created by anyone with an internet connection. There are also options to develop data summaries of crashes. <https://saver.iowadot.gov/>.

Crash maps can also be requested through the Iowa Traffic Safety Data Service (ITSDDS). More information is available on the following website: www.ctre.iastate.edu/itsdds/. ITSDDS can provide crash analysis maps, diagrams, and reports such as:

- Crash histories for specific areas, roads, and intersections
- Fatalities and/or injuries
- Alcohol-related crashes
- Seatbelt status
- Cross-median crashes
- Pedestrian crashes
- Weather conditions

2.3.1.3. “Message Monday”

Iowa DOT’s “Transportation Matters” blog includes an update every Monday that shows the week’s safety message. Individuals can either check the blog each Monday, or sign up to receive updates via email by clicking the “Subscribe” button in the upper right corner of the page: <http://www.transportationmatters.iowadot.gov/>. The information contained in the “Message Mondays” can be posted to county websites or social media pages, and can be used in the schools to educate students. **Figure 3** shows an example message from January 2018.

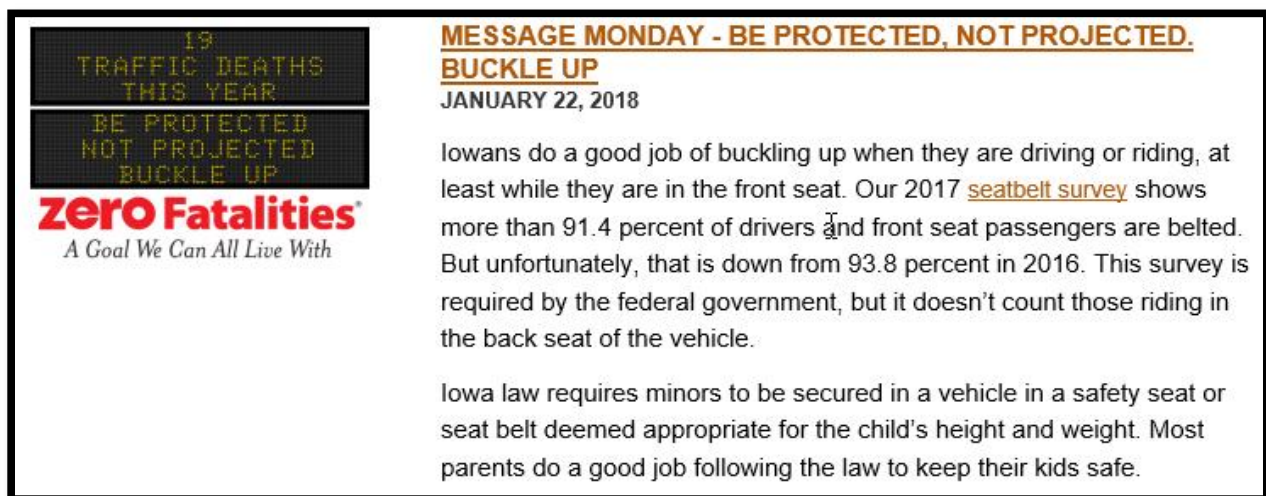


Figure 3 – Example Iowa DOT Transportation Matters Blog Post

2.3.1.4. Iowa Living Roadway Trust Fund (LRTF)

Since 1990, the LRTF has funded more than \$17 million for research and demonstration projects, vegetation inventories, education and training programs, gateway landscaping, snow and erosion control, roadside enhancement, and more. Establishing prairie plants in roadside rights-of-way reduces snow drift and winter glare, and provides low-maintenance weed and erosion control. Additional information is available at: <http://www.iowadot.gov/lrtf/index.html>.

2.3.1.5. CarFit

This program includes organized events designed to provide a quick and comprehensive check on how the driver and vehicle work together. Developed by the American Society on Aging, the



focus of the program is on older drivers, but could benefit all drivers. Check the CarFit website at www.car-fit.org for an event in your community, or contact the Office of Driver Services to schedule an event (515-244-8725 or ods@iowadot.us). Visit the Iowa DOT website for more information on this program: <https://iowadot.gov/mvd/carfit>

2.3.2. Iowa Local Technical Assistance Program (LTAP)

Iowa LTAP serves local governments and helps them keep up with growing demands on local roads, streets, bridges, and public transportation. The center provides technical and management assistance to local transportation officials through multiple programs and trainings.

<http://www.iowaltap.iastate.edu/>

2.3.2.1. Multi-Disciplinary Safety Teams (MDSTs)

Iowa's MDST Program facilitates the development and operations of local multi-discipline safety teams to help identify and resolve local crash causes and enhance local crash response practices (<http://www.iowaltap.iastate.edu/MDST/>). By coordinating communication and collaborating with other stakeholders, participants gain a broader perspective on safety issues and learn best practices from professionals outside their area of expertise. This ultimately leads to the development of solutions that may not have been considered otherwise. If you are interested in developing an MDST for your area, contact Theresa Litteral, Statewide MDST Facilitator, for more information (515-294-7465 or litteral@iastate.edu).

2.3.2.2. Road Safety Assessments (RSAs)

An RSA is a formal safety performance examination that reviews, in detail, the geometry of a roadway facility. As part of an RSA, an independent, multi-disciplinary team assesses the condition of a given roadway and provides short-, mid-, and long-term recommendations for safety improvements for all modes provided, or planned to be provided by the facility. RSAs have been conducted throughout the United States and are generally accepted as a proactive, low-cost approach to improve safety. This countermeasure cost estimate listed in the project sheets does not include the cost of implementing the recommendations of the RSA.

If you are interested in identifying funding for and conducting an RSA in your county, please contact David Veneziano, the LTAP Safety Circuit Rider, for more information (515-294-5480 or dvenez@iastate.edu).

2.3.3. Iowa Department of Public Safety Governor's Traffic Safety Bureau (GTSB)

"The Mission of the GTSB is to identify traffic safety problems and, partnering with city, county, state and local agencies, develop and implement traffic safety programs to reduce death and injury on Iowa's streets and highways. The GTSB provides federally-funded grants to city, county and state entities, as well as hospitals, universities, and other non-profit agencies working to improve traffic safety in the State of Iowa." <http://www.dps.state.ia.us/commis/gtsb/>.

2.3.3.1. Educational Materials

Educational materials are available from GTSB, and can be requested through an online application or accessed via their website <http://www.dps.state.ia.us/commis/gtsb/brochures.shtml> and printed on your own. A copy of the request form along with some of the available materials are included in **Appendix F**. Materials available include the following:

- Rural Road Safety Information Card
- 0.8 Iowa's Operating While Intoxicated (OWI) Law
- Child Passenger Safety Guides

2.3.3.2. Fact Sheets

GTSB maintains fact sheets and media campaign information for the following driver-related countermeasures:

- Child Passenger Safety
- Impaired Driving
- Motorcycle Safety
- Seat Belts
- Distracted Driving

More information can be found at <http://www.drivesmartiowa.com/childpassengersafety>.

2.3.3.3. Enforcement Funding

Iowa's special Traffic Enforcement Program (sTEP) invites participation from law enforcement agencies to conduct "high-visibility" enforcement events in connection with national campaigns. This program provides up to \$4,200 for overtime enforcement or equipment targeting traffic safety during designated sTEP waves throughout the year. A copy of the application for 405d funding is located in **Appendix F**.

2.3.3.4. Non-Enforcement Funding

Most non-enforcement agencies (hospitals, schools, etc.) have the option to apply for 402 funding because it is a broader traffic safety program that focuses specifically on alcohol/impairment programs. A copy of the application for 402 funding is located in **Appendix F**.

2.3.3.5. Safety Checkpoint Trailer

GTSB has a safety checkpoint trailer that contains all the equipment needed to set up a safety checkpoint. The trailer is available free of charge, and those wishing to use it should contact GTSB to schedule a date and pick-up/drop-off time.

2.3.3.6. Advanced Roadside Impaired Driving Enforcement (ARIDE)

GTSB provides training for Advanced Roadside Impaired Driving Enforcement (ARIDE) for law enforcement officers. This course is designed such that officers become more proficient at detecting, apprehending, testing, and successfully prosecuting impaired drivers.

2.3.3.7. Other GTSB Resources

GTSB has "drunk goggles" and a driving simulator that can be used for events to simulate the effects of impaired and distracted driving including reduced alertness, slow reaction time, visual distortion, alteration of depth and poor decision making. In addition, GTSB has summary sheets that can be provided to law enforcement succinctly summarizing Iowa child passenger safety, seat belts, and cell phone laws. Examples are included in **Appendix F**.



CAN'T SEE? DON'T GO.

IOWA'S UNCONTROLLED INTERSECTIONS

WHAT CAN YOU DO?

SLOW DOWN. IF YOU CAN'T SEE, DON'T GO.
When you encounter a blind intersection, approach it very slowly and alertly until your view is no longer blocked and you can see the way is clear. Only then should you proceed.

MAKE SURE YOU CAN SEE.
It may be hard to see vehicles approaching an uncontrolled intersection at dawn, dusk, and during nighttime hours. Seasonal obstacles like tall corn or snow, as well as structures like buildings, may also block the view of an approaching vehicle.

DON'T RELY ON DUST.
Recent rain or snow or dust control material cuts down on dust produced by vehicles in the opposite direction. In addition, dust is not visible during night time hours. Always slow down and assure the way is clear before going.

DRIVE DEFENSIVELY.
Always assume when approaching an intersection that cross traffic may not yield to the right-of-way.

IN 2015, 52 OF THE 88 PEOPLE KILLED AT INTERSECTIONS IN IOWA WERE KILLED AT A RURAL INTERSECTION.

ia.zerofatalities.com

LIKE US ON FACEBOOK: **ZeroFatalitiesIowa** FOLLOW US ON TWITTER: **@zeroiowa**

Zero Fatalities
A Goal We Can All Live With

Brought to you by:
Iowa's County Engineers, Governor's Traffic Safety Bureau, and Iowa DOT.

MM58 02/11/2016



2.3.4. Blank Children's Hospital

2.3.4.1. Child Passenger Safety

The Blank Children's Hospital provides an entire webpage focused on child passenger safety: <https://www.unitypoint.org/blankchildrens/child-passenger-safety.aspx>.

2.3.4.2. For Parents

Resources are available for parents including instructions on proper child restraint as well as registration for a free one-hour car seat safety class that is held twice a month. There is also information on locations for child safety seat inspections throughout the state.

2.3.4.3. National Child Passenger Safety Certification Training Program

The National Child Passenger Safety Certification Training Program is a three- to four-day training course that is paid for with funding provided by GTSB. The certification fee is \$85.00.

2.3.4.4. Bike Safety

The Blank Children's Hospital has an All Heads Covered: Our Wheeled-Sports Safety Program. This program includes a curriculum kit that is designed to help educators teach bike and wheeled-sports safety in the classroom or community for elementary-aged children. They also have a Bike Safety Van that houses all the equipment to host a bike rodeo and is offered free of charge. Additionally, low-cost helmets are available through the program. Additional information is available on the following website: <https://www.unitypoint.org/blankchildrens/bike-safety.aspx>.

2.3.5. Other Websites and Resources

The following sections contain information on other websites and resources for traffic safety related information. Counties can use this information on their websites, social media outlets, or consider posting materials on bulletin boards in public spaces. An example can be seen in **Figure 4**, as found in Cedar County. Additionally, there are materials that can be used in schools to educate future and young drivers on the importance of wearing seatbelts.



Figure 4 – Safety Bulletin Board in Cedar County



2.3.5.1. National Highway Traffic Safety Administration (NHTSA)

NHTSA has a wide variety of resources related to traffic safety which could be used by the county. NHTSA offers materials for numerous traffic safety campaigns, including drunk driving, car seats, vehicle safety, distracted driving, and motorcycles. These marketing tools offer a way to get involved through traditional media and online media (<https://www.nhtsa.gov/>).

2.3.5.2. Traffic Safety Marketing

Traffic Safety Marketing is an online resource for safety materials and can be used for safety campaigns. Counties are encouraged to download and use the traffic safety materials provided during campaigns and throughout the year. There are various materials that are free of charge and others that can be paid for. More information can be found at:

<https://www.trafficsafetymarketing.gov/>.

2.3.5.3. Insurance Company Safety Information

Transportation safety information for young drivers is provided by various insurance companies, that could be used as a resource.

- Allstate Helping Teen Drivers Build Good Habits Website
 - <https://www.allstate.com/auto-insurance/auto-insurance-teen-driver.aspx>
- Farmers Teen Driving Safety Program
 - <https://www.farmers.com/inner-circle/car-safety/teen-driving-safety-program/>
- GEICO Car Insurance Information and Resources for Teen Drivers Website
 - <https://www.geico.com/information/safety/auto/teendriving/parents/>
- Progressive Teen Driver Website
 - <https://www.progressive.com/auto/new-teen-drivers/>
- State Farm Teen Driver Safety Website
 - <http://teendriving.statefarm.com/>

2.3.5.4. Cell Phone Providers and Apps

AT&T has a mobile simulator that can be used to demonstrate the impacts of distracted driving. More information can be found on their website: <http://itcanwaitsimulator.org/>

There are various mobile applications (apps) that can be installed on phones to help prevent drivers from using their phones while driving. A few examples include:

- | | |
|-------------------|--------------|
| ▪ AT&T DriveMode | ▪ Live2Txt |
| ▪ Cellcontrol | ▪ Mojo |
| ▪ Drivesafe.ly | ▪ Overwatch |
| ▪ Drive Safe Mode | ▪ Safe Drive |
| ▪ EverDrive | ▪ TrueMotion |
| ▪ LifeSaver | |

Verizon provides a website with a brief review of recommended apps to discourage texting while driving:

- <https://www.verizonwireless.com/archive/mobile-living/home-and-family/apps-to-block-texting-while-driving/>

DMV.org provides a resource and review of “Apps to Fight Distracted Driving” here:

- <https://www.dmv.org/distracted-driving-apps.php>

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3. DATA COLLECTION

As part of the LRSP project, a comprehensive GIS project database was developed utilizing crash data, roadway data, horizontal curve data, and the intersection database. The following sections describe the databases utilized for creation of the project geodatabase and later used for analysis.

3.1. Crash Data

The Iowa DOT statewide crash database includes crash history for all crashes occurring on a public roadway in the state that involve a personal injury or that satisfy a minimum property damage threshold of \$1,500. This database is updated monthly.

The crash database provides crash-, driver/vehicle-, and person-level attributes. All crashes are geocoded with respect to the Iowa DOT Geographic Information Management System (GIMS) roadway database. This LRSP utilizes 10 years of crash data for crashes occurring on roadways of interest between January 1, 2007 and December 31, 2016 (as of the May 15, 2017 database update).

Crashes included in the crash database were identified based on their “County” and “Concatenated System” attribute values. “Concatenated System” is an Iowa DOT-derived attribute, conveying the roadway system(s) on which a crash was located. The three roadway systems in Iowa are the Primary system (state-owned), the Secondary system (county-owned), and the Municipal system (city-owned). All crashes with a “Concatenated System” value containing “Secondary,” including intersections with state roadways, were selected for analysis.

“County” attributes were added to the database to clearly identify on which system a crash likely occurred, as well as address any possible ambiguities in the initial “Concatenated System” derivation. This was initially accomplished by analyzing the spatial proximity of crashes with respect to county roads, as defined in the GIMS database. Additional analysis was performed for a limited number of crashes not located through the aforementioned technique.

3.2. Roadway Data

Various databases were used that contain different roadway data elements, including the GIMS, horizontal curve, intersection, pavement management, roadside hazard, and 911 address databases. Information on location of existing stop signs and updates to the databases were also considered.

3.2.1. GIMS Database

The Iowa DOT GIMS database includes various roadway characteristics for all public roads in Iowa. Roadway attributes are regularly updated by the Iowa DOT from various sources, including local agency submittals. An annual GIMS history snapshot is created, representing the prior calendar year. This LRSP utilizes the GIMS history snapshot representing the year 2015.

3.2.2. Horizontal Curve Database

A horizontal curve geospatial database was created for the Iowa DOT by the Wisconsin Traffic Operations and Safety Laboratory. This database includes horizontal curve alignments on the county road system. This project utilizes the January 25, 2016 version of the database.



3.2.3. Intersection Database

The Institute for Transportation at Iowa State University (InTrans) and the Iowa DOT have collaborated over the past several years to create a statewide intersection database. The foundation of this database is a GIS-based intersection point file created by the Iowa DOT's Office of Traffic and Safety. A selected set of inventory elements are being captured for each intersection and approach roadway with aerial imagery and street-level images. This LRSP utilizes the April 2017 version of the intersection database.

3.2.4. Pavement Management Database

The Iowa DOT provided the 2015-2016 pavement management database for use in this project. The *Highway Safety Manual* (HSM) suggests that pavement in better condition provides less potential for crashes. The use of this database and the recorded International Roughness Index (IRI) help determine additional potential for crashes along roadway segments.

3.2.5. Roadside Hazard Database

In coordination with InTrans, a roadside hazard ranking was developed using the United States Road Assessment Program (usRAP) guidance on roadside hazards and severity (www.usrap.org). The roadside assessment for the LRSPs is intended to represent the conditions along a half-mile section of roadway. The protocol was adapted from the usRAP approach. The following summarizes the general intent of the roadside assessment:

- Objects within 66 feet (20 meters) of the edge line were captured.
- A combination of the Street View and the aerial image was used to judge roadside distances and roadside conditions.
- Assessment based on the visible portion of Street View. Navigation along the roadway was limited, unless necessary to perform a better assessment.
- If the aerial image was clearly more recent than Street View, it was given additional consideration during assessment.
- Emphasis was on roadside conditions that could lead to a fatal or serious crash upon roadway departure.
- Generally overlooked isolated features, such as boulders, guardrail, etc.
- If the assessment point was at a special feature, like a bridge, the assessment point was repositioned to a more representative location.
- When no physical object was present along the roadside, the shape, foreslope, and backslope of the ditch were the primary consideration in the assessment.
- In some cases, multiple roadside hazards were present. The most hazardous was recorded.

A roadside assessment rating was assigned based on a combination of posted speed, distance to an object, and the object itself. The rating assignments used usRAP Road Attribute Risk Factors (operating and mean speed, roadside severity – object, roadside severity – distance). Ratings were calculated for both the driver and passenger side and averaged for each point. Finally, all the points within a roadway segment were averaged and an average roadside assessment rating was used to determine risk factor points, as described in later sections.

The roadside hazard rating was documented at half-mile intervals along each county paved roadway to assign crash risk factor points to individual segments.



3.2.6. 911 Address Database

The Webster County 911 address database documents driveway addresses for businesses, homes, and structures within the county. It was utilized to obtain driveway locations along the county paved roadway system for this project. While this database does not document all access points along the roadway system, such as farm access roadways, it does capture locations with a higher number of vehicular turning movements, such as homes and businesses. Roadway segments with a greater number of access points have a higher risk for crashes, due to increased potential for vehicle conflicts.

3.2.7. Stop Sign Locations

While the intersection database contains the control type for the intersection (all-way stop, two-way stop, one-way stop, etc.), stop control at the approach level is not included. The County Engineer provided information indicating where stop signs were located along the county paved roadway system. This information was geocoded into the GIS database.

3.2.8. Existing Condition Updates to the Databases

Throughout the LRSP process, the County Engineer provided feedback on locations where the information contained within the existing databases was not current (for example, location of rumble strips, shoulder type and/or width, etc.). When these locations were identified, updates were made to the database.

3.3. Crash Tree Development

The following sections describe the development of crash trees as a means of displaying county crashes. As previously noted, "County" road attributes were added to the crash database to identify on which system a crash likely occurred as well as to address any possible ambiguities in the initial "Concatenated System" derivation. This was initially completed through analysis of the spatial proximity of crashes with respect to county roadways, as defined in the GIMS database. Additional review was performed for a limited number of crashes not addressed through the aforementioned technique. Crashes occurring along county roads that were on the border were identified as occurring in both counties.

3.3.1. County Roadways

To supplement the crash database with additional available data sets, two new attributes relating to horizontal curvature and intersection traffic control were added and populated. Specifically, a horizontal curvature attribute was populated for all crashes within 200 feet of a horizontal curve on a paved county roadway. This was necessary because roadway alignment information is not currently captured on the standard Iowa DOT crash report form. The traffic control for county paved and unpaved roadway intersection crashes was populated based on their spatial proximity to the current statewide intersection database points and the corresponding reported traffic control at these intersections.

Upon identifying all "County" road crashes from the crash database, the Iowa DOT-derived "Paved" attribute was used to segregate the county roadway crashes into paved and unpaved surface types. For each of these surface types, the standard Iowa DOT crash database attributes of "Type of Roadway Junction/Feature," "Manner of Crash/Collision," and "Major Cause" were used to populate the trees. The new traffic control attribute was used to separate county paved and unpaved roadway intersection crashes into the different traffic control type categories. The new horizontal curvature attribute was used to separate non-intersection crashes into "on curve" and "off curve" categories.



A second set of crash trees was then created in a similar manner, simply limiting the crashes to “Fatal” and “Major Injury,” based on the Iowa DOT derived “Crash Severity” attribute. The two sets of crash trees were combined, and were utilized in the development of this LRSP.

3.3.2. Major Cause and Manner of Crash

“Major Cause” and “Manner of Crash” statistics are provided in the crash trees and are based on total crashes. The fatal and serious injury crashes had similar characteristics to the total crashes for the county.



4. DATA ANALYSIS

From January 1, 2007 to December 31, 2016, there were a total of 1,785 crashes on county roads in Webster County, of which 123 resulted in serious injuries and fatalities. The following sections contain crash maps and summarize the data analysis prepared for the county, noting how it compares to the state of Iowa as a whole. Crash trees, high crash locations, and additional crash data analysis are included in this section.

4.1. Comparison of County Crashes to SHSP Key Safety Emphasis Areas

The 2017 Iowa SHSP was reviewed in this plan. As part of the Iowa SHSP, five years of crash data for crashes resulting in fatalities and serious injuries were separated into 17 safety emphasis areas, which are generally defined by the AASHTO SHSP. This process determined the safety emphasis areas with the greatest number of crashes within Iowa, and resulted in the focused opportunities for safety improvements on Iowa roadways.

For consistency with the two prior phases of the LRSP project, **Table 1** contains a comparison of Webster County crashes resulting in fatalities and serious injuries to the Key Safety Emphasis Areas from the 2013 Iowa SHSP. Because the SHSP was based on five years of crash data, five years of crash data (2012 to 2016) for the county was utilized to compare the crashes to the Iowa Key Safety Emphasis Areas. As shown in the table, the county crashes generally follow the same Key Safety Emphasis Areas as the state. **Table 2** shows the difference in rank for comparison. As shown in **Table 1** and **Table 2**, the Key Safety Emphasis Areas for the county generally rank the same as the Key Safety Emphasis Areas from the SHSP. It should be noted that this analysis includes all fatal and serious injury crashes within the county, not just on county roads.



Table 1 – County Fatalities and Serious Injuries by Safety Emphasis Area

Category	Safety Emphasis Area	Statewide Totals			Webster County			Key Safety Emphasis Area
		Fatal and Serious Injury	% of Total	Rank	Fatal and Serious Injury	% of Total	Rank	
		9,402	100%	N/A	134	100%	N/A	
Drivers	Younger Drivers	3,233	34%	6	64	48%	3	X
	Older Drivers	1,687	18%	9	22	16%	9	X
	Speed-Related	4,774	51%	3	61	46%	4	X
	Impaired Driving	2,072	22%	8	29	22%	8	X
	Inattentive/Distracted Driving	988	11%	12	18	13%	11	
	Unprotected Persons	3,245	35%	5	56	42%	5	X
Highway	Train	39	0%	18	3	2%	15	
	Lane Departures	5,269	56%	1	89	66%	2	X
	Roadside Collision	3,444	37%	4	42	31%	6	X
	Intersections	2,789	30%	7	38	28%	7	X
	Work Zone	150	2%	17	0	0%	18	
	Local Roads	4,963	53%	2	104	78%	1	X
	Winter Road Conditions	781	8%	13	20	15%	10	
Special Users	Pedestrian	495	5%	14	6	4%	14	
	Bicycle	227	2%	15	2	1%	16	
Vehicles	Motorcycle	1,494	16%	10	16	12%	12	X
	Heavy Truck	1,079	11%	11	14	10%	13	
	Other Special Vehicle	179	2%	16	1	1%	17	

Numbers in the columns may not add up to the totals because the injuries in one crash may be associated with multiple emphasis areas. For example, there could be a lane departure crash with serious injuries involving an impaired young driver on a local road.

Source: Iowa crash data records 2012-2016.

Table 2 – County Fatalities and Serious Injuries Rank by Safety Emphasis Area

Category	Safety Emphasis Area	Rank			Key Safety Emphasis Area
		Statewide Totals	Webster County	Change in Rank	
Drivers	Younger Drivers	6	3	+3	X
	Older Drivers	9	9	-	X
	Speed-Related	3	4	-1	X
	Impaired Driving	8	8	-	X
	Inattentive/Distracted Driving	12	11	+1	
	Unprotected Persons	5	5	-	X
Highway	Train	18	15	+3	
	Lane Departures	1	2	-1	X
	Roadside Collision	4	6	-2	X
	Intersections	7	7	-	X
	Work Zone	17	18	-1	
	Local Roads	2	1	+1	X
	Winter Road Conditions	13	10	+3	
Special Users	Pedestrian	14	14	-	
	Bicycle	15	16	-1	
Vehicles	Motorcycle	10	12	-2	X
	Heavy Truck	11	13	-2	
	Other Special Vehicle	16	17	-1	

4.2. Crash Maps

Crash severity maps for the county were created by employing an InTrans-developed, GIS-based crash stacking tool. The purpose of this tool is to produce maps in which spatially proximate crashes are vertically offset to produce crash “stacks,” better conveying crash experience and severity at higher frequency locations. All crashes indicated as “County” were selected and stacked by ascending severity. In other words, the more serious crashes were located at the bottom of the crash stack, nearer to the actual crash location on the roadway. Given the small map scale (county-level), a 300-meter (985-foot) spatial proximity was utilized to provide a clearer map.

Figure 5 contains a map illustrating all crashes on county roads within the county stacked by ascending severity. **Figure 6** contains a map illustrating all fatal and serious injury crashes stacked by ascending severity. As shown in the maps, the majority of the county road crashes occurred on county paved roads as opposed to unpaved roads.

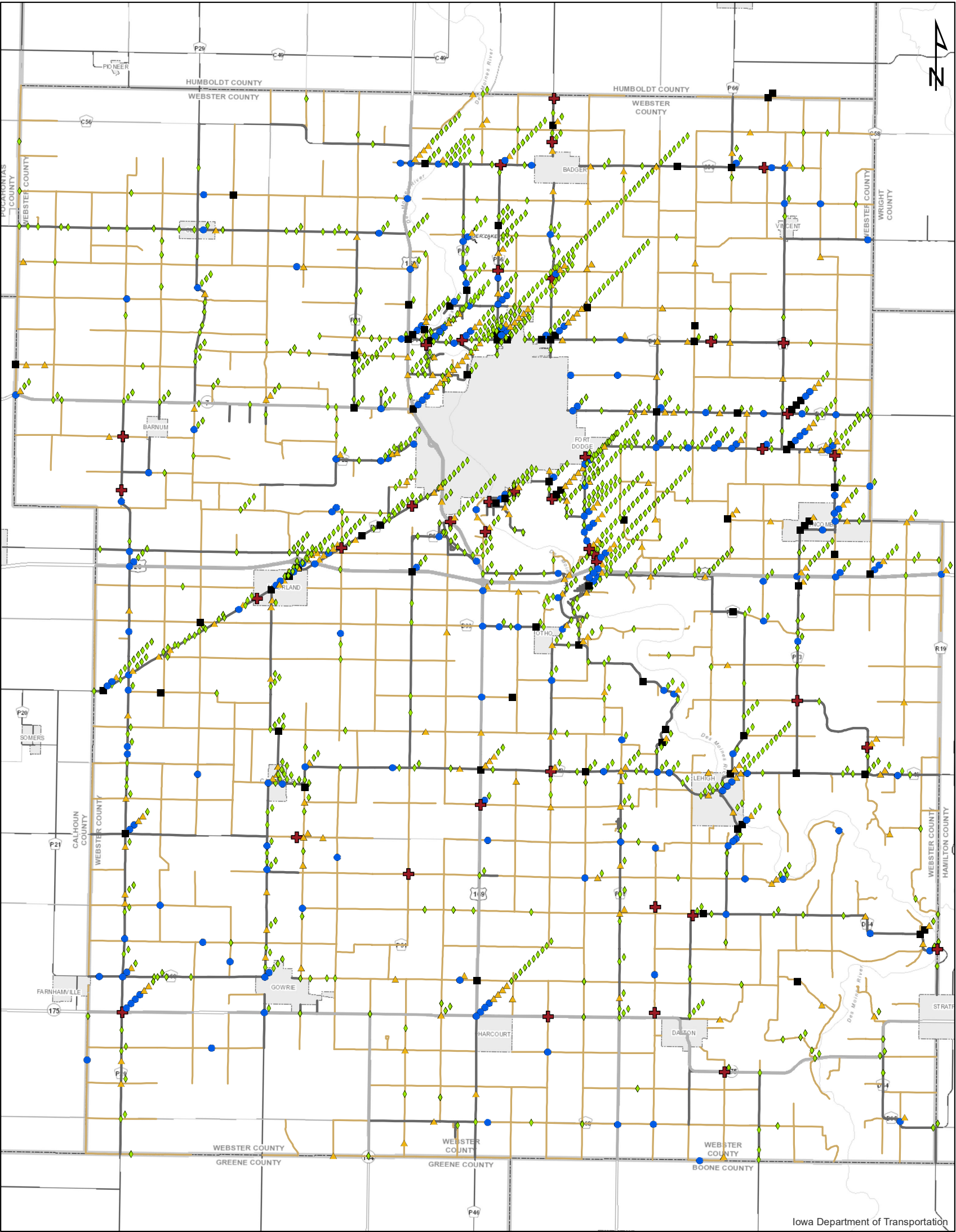


4.3. Crash Trees

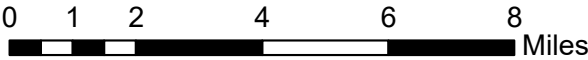
In order to further define the types of roadway features associated with crashes, two crash trees were developed for the county:

- County Paved Road Crashes (**Figure 7**)
- County Unpaved Road Crashes (**Figure 8**)

The crash trees include total crashes as well as fatal and serious injury crashes; however, the major cause of the crash and manner of crash are reported only for total crashes. In the county, the fatal and serious injury crashes had similar major causes and manners of crash as the total crashes.



The information contained in this map was derived from the May 15, 2017 Iowa DOT crash database.



Crash Severity

- ✚ Fatal (40)
- Serious Injury (83)
- Minor Injury (217)
- ▲ Possible/Unknown Injury (275)
- ◆ Property Damage Only (1,170)

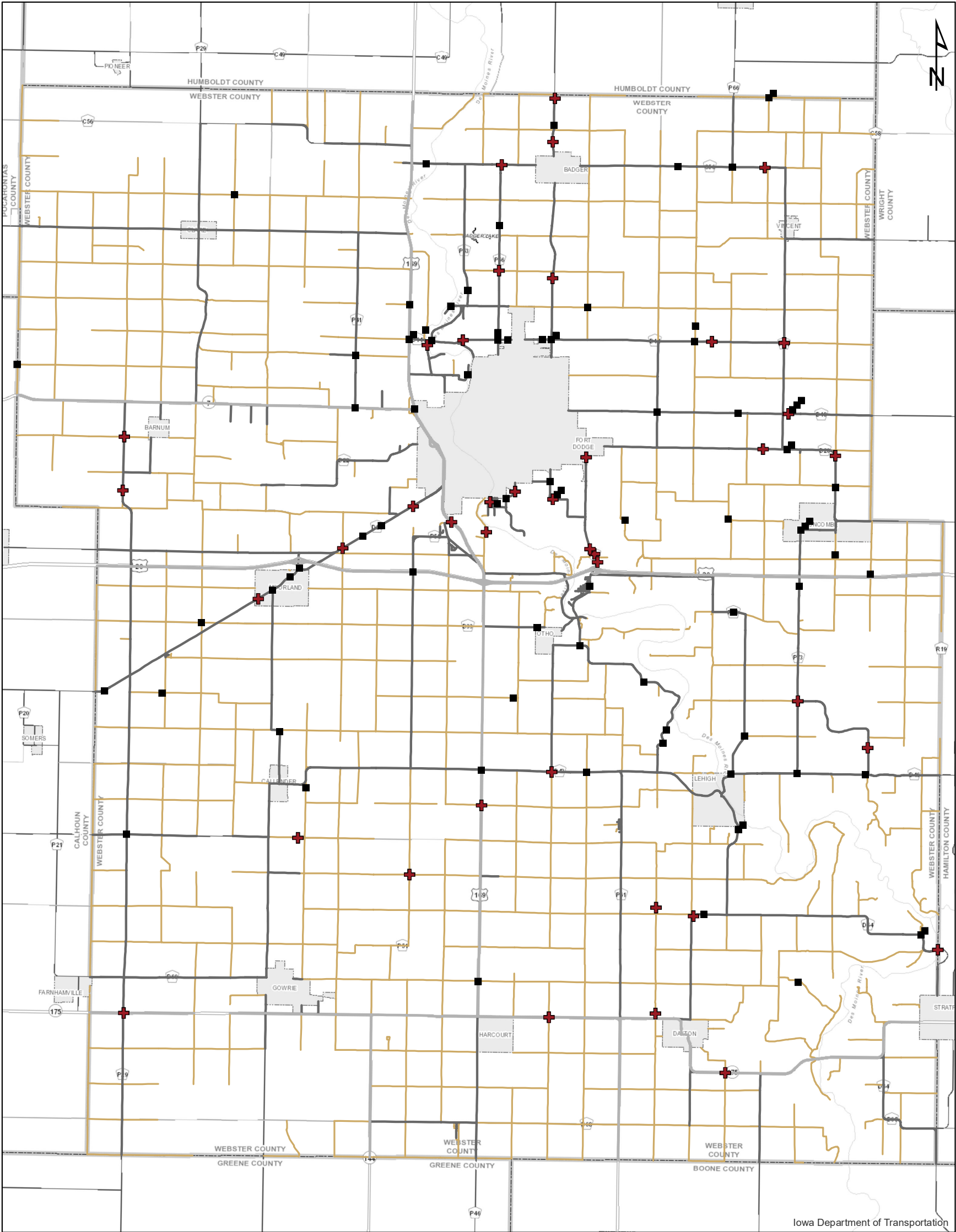
All Crashes
County Roads
Webster County, Iowa
2007 - 2016

Highways

- State
- County Paved
- County Unpaved

Date: 8/10/2017

Figure 5 – All Crashes County Roads



The information contained in this map was derived from the May 15, 2017 Iowa DOT crash database.

0 1 2 4 6 8 Miles

Crash Severity

- Fatal (40)
- Serious Injury (83)

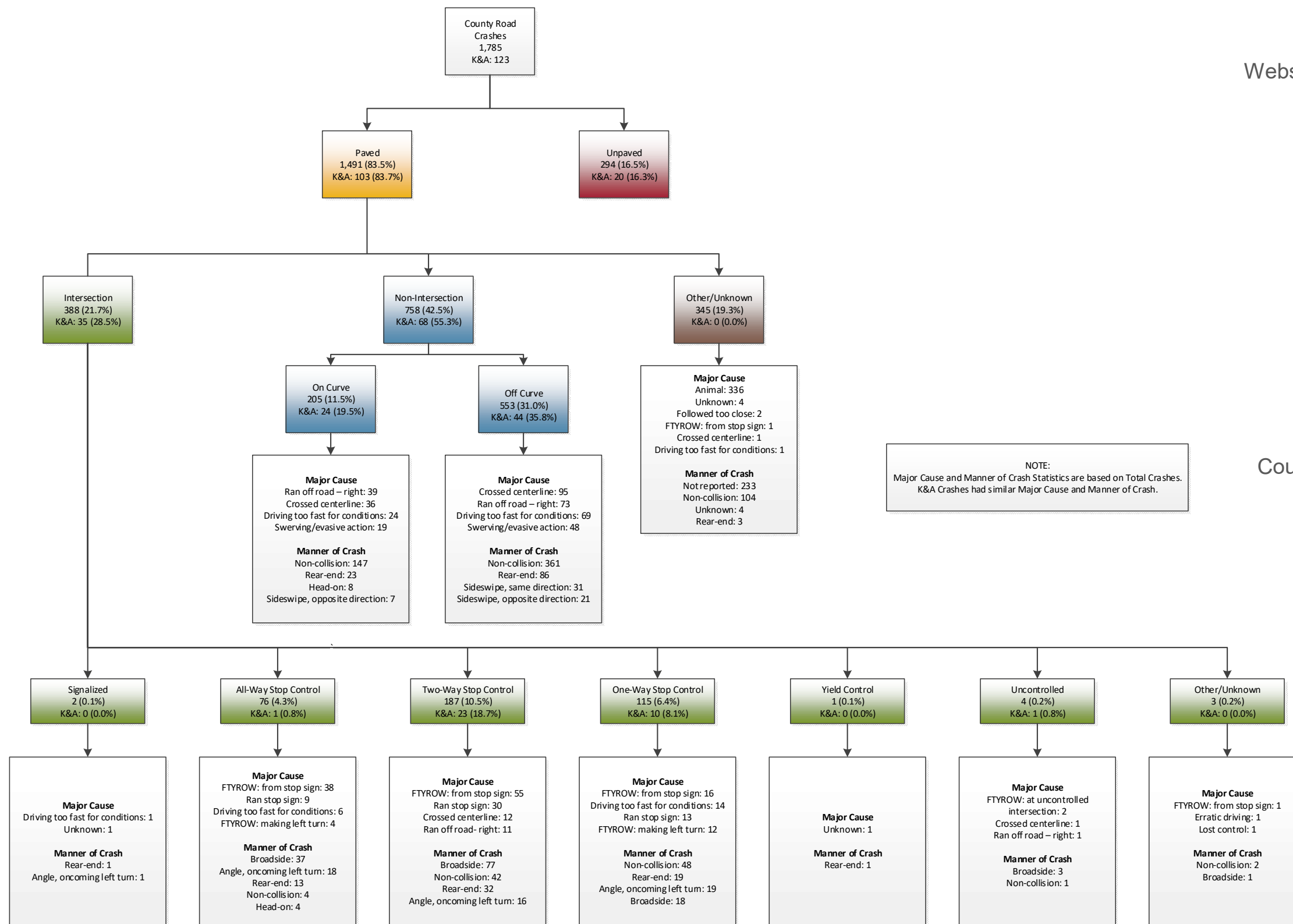
**Fatal and Serious Injury Crashes
County Roads
Webster County, Iowa
2007 - 2016**

Highways

- State
- County Paved
- County Unpaved

Date: 8/10/2017

Figure 6 – Fatal and Serious Injury Crashes County Roads



NOTE:
Major Cause and Manner of Crash Statistics are based on Total Crashes.
K&A Crashes had similar Major Cause and Manner of Crash.

Webster County (1,785 County Road Crashes)

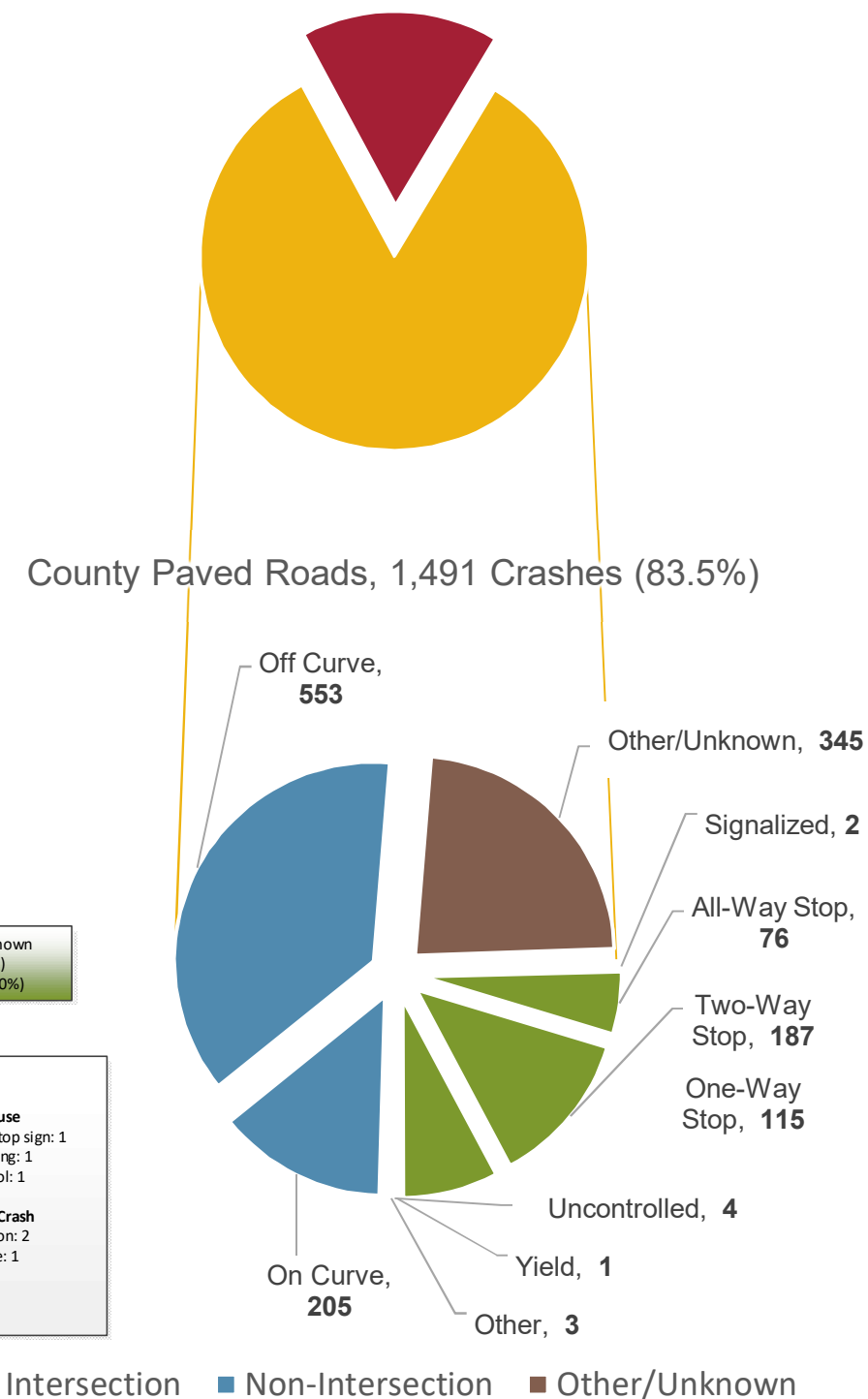


Figure 7 – County Paved Road Crash Tree



Webster County (1,785 County Road Crashes)

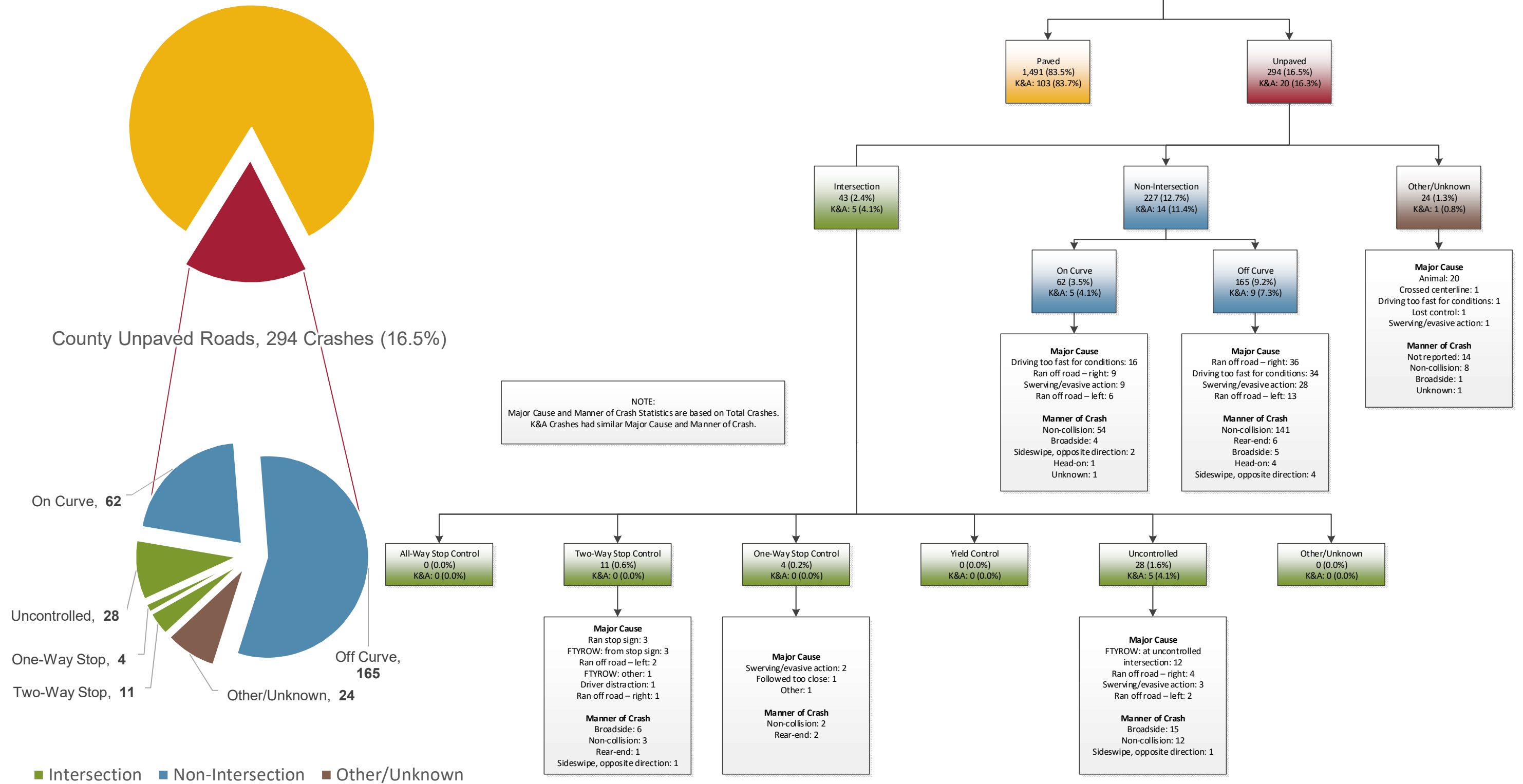


Figure 8 – County Unpaved Road Crash Tree

Table 3 contains a tabular summary of the county crashes by roadway type and **Figure 9** contains a graphical summary of the county crashes by roadway type, which is the same information presented in the crash trees. K denotes a fatality and A denotes a serious injury.

Table 3 – County Crashes by Roadway Type

Roadway Type		Total Crashes		Fatal and Serious Injury (K & A) Crashes	
		Count	Percent	Count	Percent
County Paved	Intersection	388	22%	35	28%
	Curve	205	12%	24	20%
	Segment	553	31%	44	36%
	Unknown	345	19%	0	0%
	Subtotal	1,491	84%	103	84%
County Unpaved	Intersection	43	2%	5	4%
	Curve	62	4%	5	4%
	Segment	165	9%	9	7%
	Unknown	24	1%	1	1%
	Subtotal	294	16%	20	16%
Total		1,785		123	

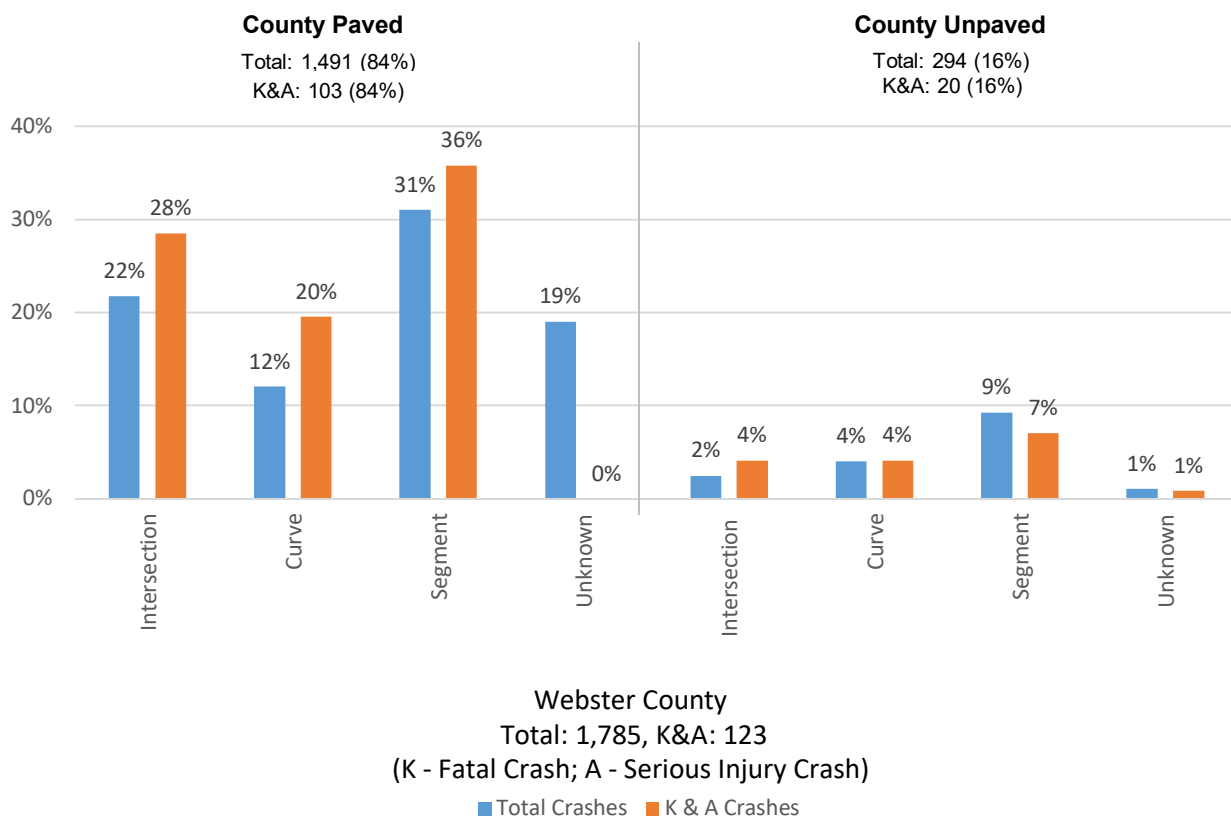


Figure 9 – County Crashes by Roadway Type



4.4. Total Crash Rates

From 2007 to 2016, there were a total of 1,785 crashes on county roadways within Webster County. **Figure 10** illustrates the comparison of the Webster County crash rate on county roads to the overall Webster County crash rate, and the Iowa crash rate during the same timeframe. As shown in **Figure 10**, the Webster County crash rate on county roads was lower than the Iowa crash rate during the study period.

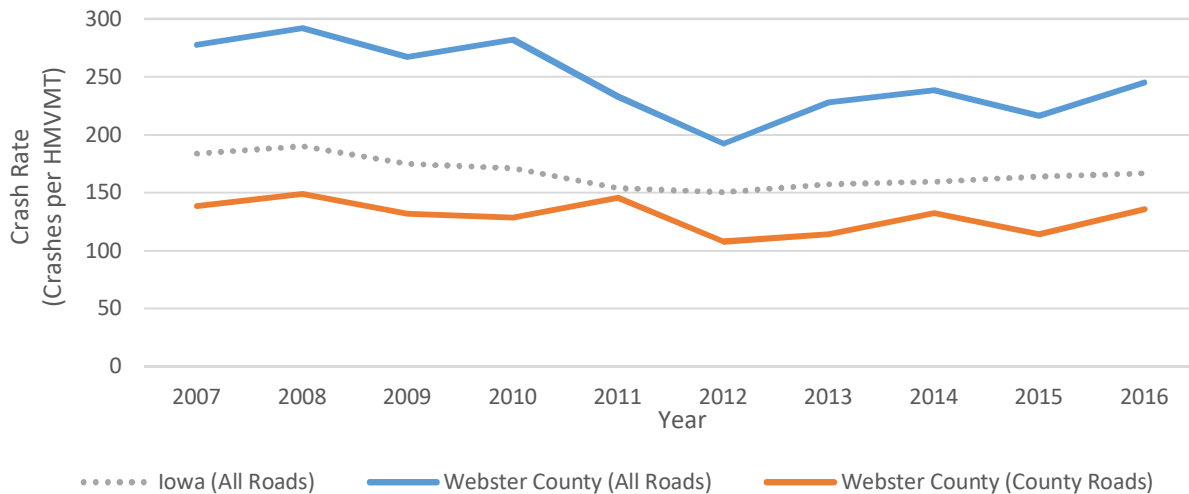


Figure 10 – Crash Rates (All Crash Severities)

4.5. Fatal and Serious Injury Crash Rates

From 2007 to 2016 there were a total of 123 fatal and serious injury crashes on county roads within Webster County. Fatal and serious injury crash rates for all roads in Webster, the county-owned roads, and all roads in Iowa are illustrated in **Figure 11**. The Webster County fatal and serious injury crash rate on county roads was higher than the Iowa crash rate with the exception of 2014.

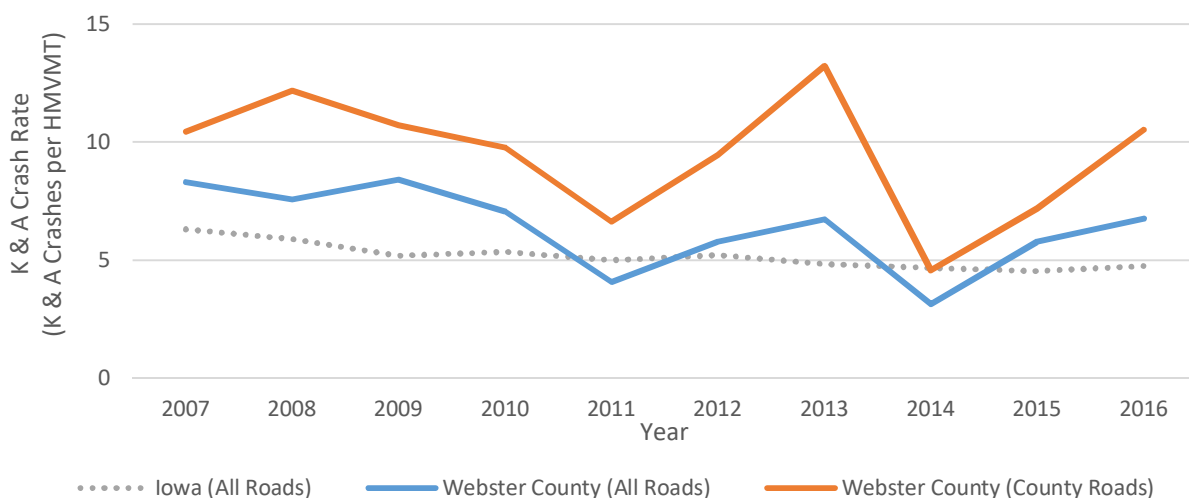


Figure 11 – Crash Rate (Fatal and Serious Injury Crashes)

4.6. Crash Rate Comparison

Figure 12 shows the average crash rates for all crashes as well as fatal and serious injury crash rates for both the county roads and statewide from 2007 to 2016. As illustrated in the figure, the county road crash rate for all crashes is lower than the statewide crash rate, but the fatal and serious injury crash rate on county roads is higher than the fatal and serious injury crash rate statewide, demonstrating the importance of a focus on fatal and serious injury crashes on county roads.

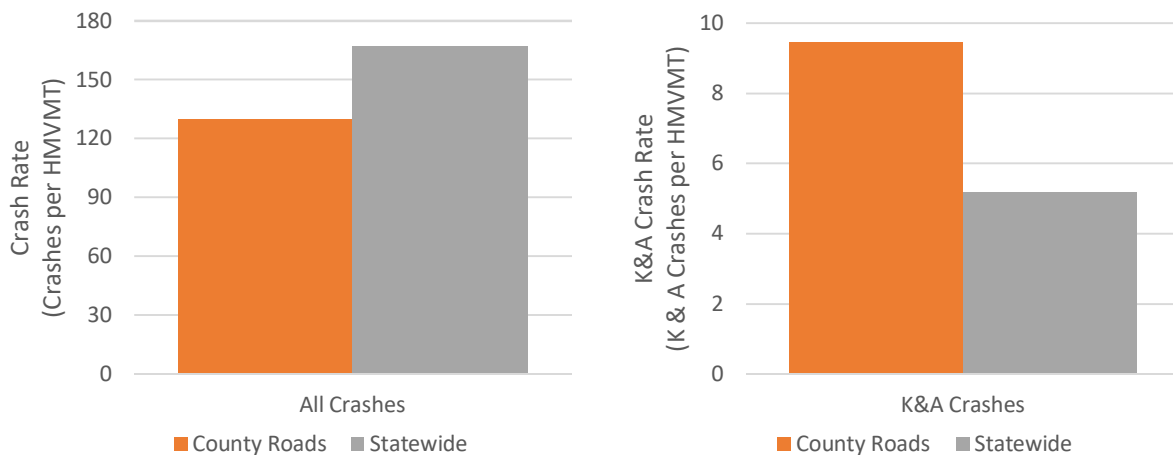


Figure 12 – County Road to Statewide Crash Rate Comparison

4.7. Additional Data Analysis

After reviewing the crash data analysis, the county requested the following additional crash data information be prepared to aid them in efforts in to reduce fatalities and serious injuries along county roads. The following information has been prepared to address their requests:

- Crashes by vehicle type data summary (**Table 4**);
- Map of crashes by vehicle type (**Figure 13**); and
- Map of winter weather-related crashes (**Figure 14**).

It should be noted that the Iowa DOT has made crash data available through a new crash mapping website, which can be used to develop additional crash maps: <https://saver.iowadot.gov>. Crash maps can also be requested through the Iowa Traffic Safety Data Service (ITSDS). More information is available on the following website: www.ctre.iastate.edu/itsds/.

The KABCO injury severity scale (National Safety Council, 1990) is used to summarize the crash data in the following tables. The KABCO scale is used by the investigating police officer on the scene to classify injury severity for occupants with five categories:

- **K**, killed;
- **A**, disabling injury;
- **B**, evident injury;
- **C**, possible injury;
- **O**, no apparent injury.

These definitions may vary slightly for different law enforcement agencies.

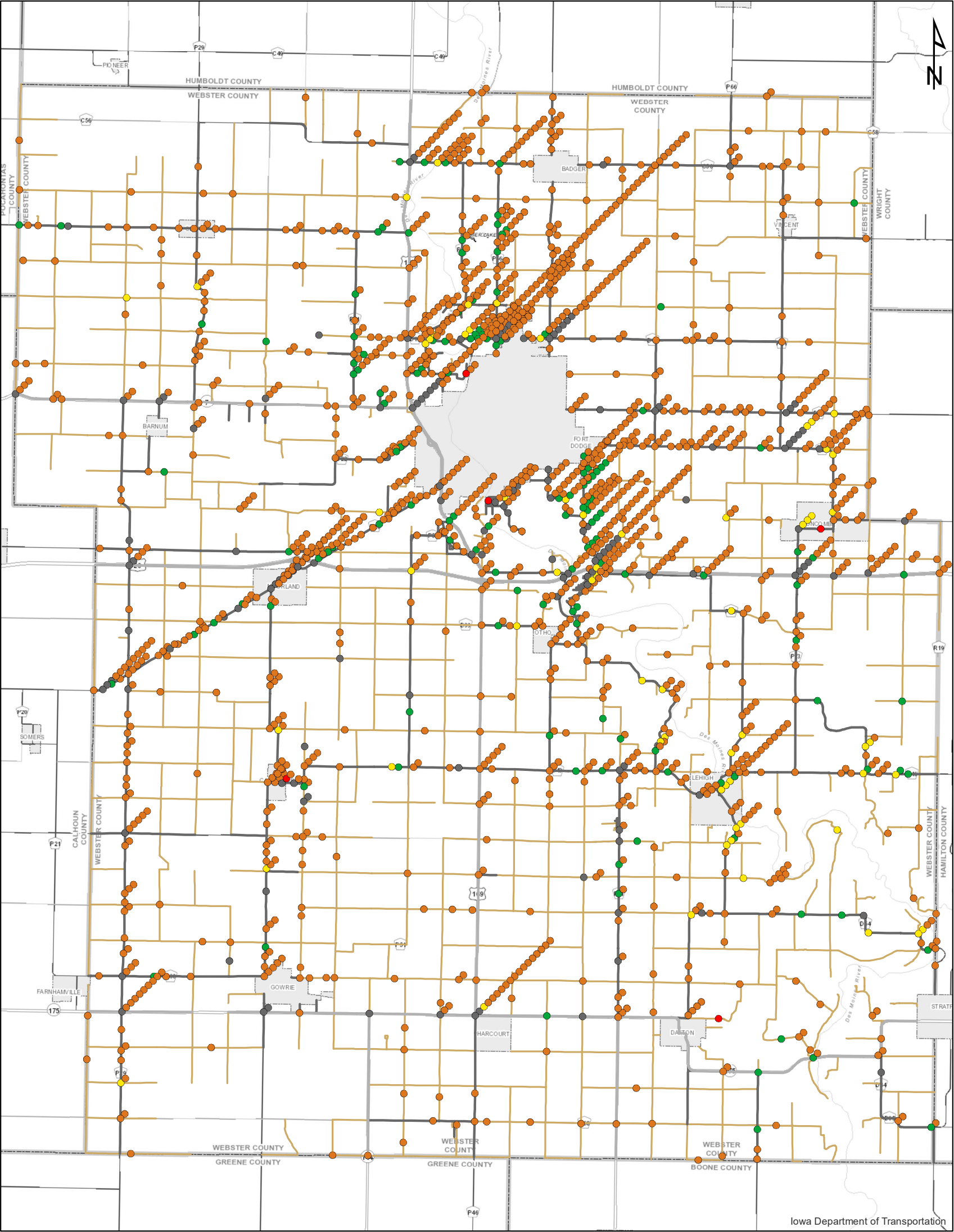


Table 4 – County Crashes by Vehicle Type

	Severity	Non-Motorist	Motorcycle	Heavy Truck	Passenger Vehicle	Other Vehicle	Total
Crash Severity	K	1	5	1	31	2	40
	A	1	16	11	54	1	83
	B	2	30	17	164	4	217
	C	1	9	27	235	3	275
	O		2	82	958	128	1,170
	Total	5	62	138	1,442	138	1,785

	Severity	Non-Motorist	Motorcycle	Heavy Truck	Passenger Vehicle	Other Vehicle	Total
Injury Severity	K	1	5	1	35	3	45
	A	1	17	15	86	1	120
	B	2	38	28	240	4	312
	C	1	15	36	374	3	429
	Total	5	75	80	735	11	906

Time of Day	Non-Motorist	Motorcycle	Heavy Truck	Passenger Vehicle	Other Vehicle	Total
Midnight to 1:59 AM	1			84	6	91
2:00 AM to 3:59 AM		1	4	80	3	88
4:00 AM to 5:59 AM			2	62	8	72
6:00 AM to 7:59 AM		4	19	151	23	197
8:00 AM to 9:59 AM		1	24	102	8	135
10:00 AM to 11:59 AM		2	21	101	4	128
Noon to 1:59 PM	3	4	23	134	4	168
2:00 PM to 3:59 PM	1	13	18	137	3	172
4:00 PM to 5:59 PM		16	12	182	15	225
6:00 PM to 7:59 PM		11	6	157	22	196
8:00 PM to 9:59 PM		6	6	136	23	171
10:00 PM to 11:59 PM		4	3	116	19	142
Total	5	62	138	1,442	138	1,785



The information contained in this map was derived from the May 15, 2017 Iowa DOT crash database.

0 1 2 4 6 8 Miles

Vehicle Type

- Non-Motorist (5)
- Motorcycle (62)
- Passenger Vehicle (1,442)
- Other Vehicle (138)
- Heavy Truck (138)

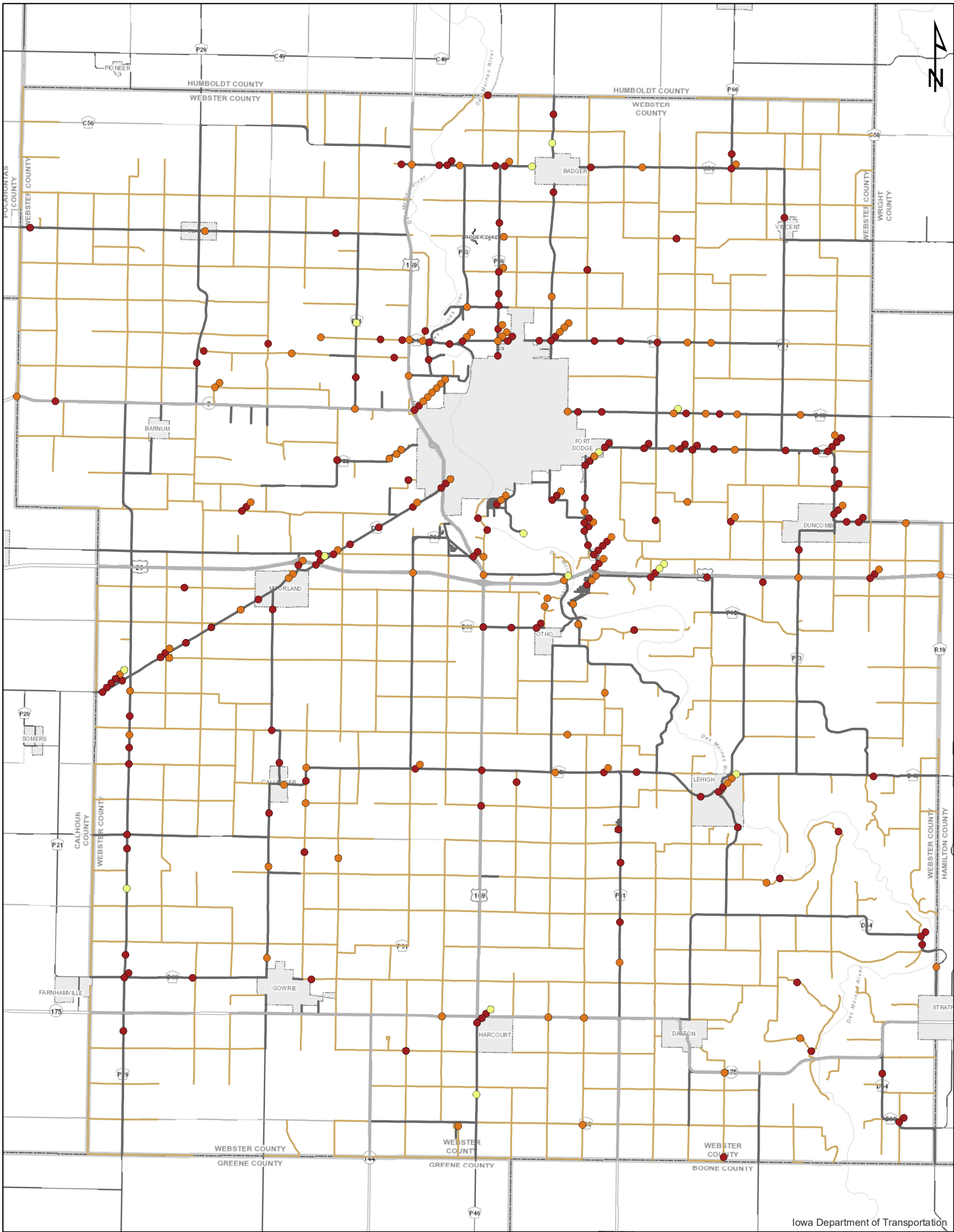
Crashes by Vehicle Type
County Roads
Webster County, Iowa
2007 - 2016

Highways

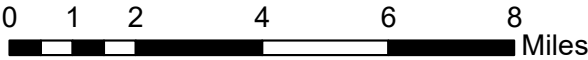
- State
- County Paved
- County Unpaved

Date: 2/6/2018

Figure 13 – Crashes by Vehicle Type



The information contained in this map was derived from the May 15, 2017 Iowa DOT crash database.



Surface Condition

- Icy Condition (180)
- Snowy Condition (108)
- Slushy Condition (15)

Winter Condition-Related Crashes

County Roads

Webster County, Iowa

2007 - 2016

Highways

- State
- County Paved
- County Unpaved

Date: 1/31/2018

Figure 14 – Winter Condition-Related Crashes



COUNTER-
MEASURE
SELECTION

5. COUNTERMEASURE SELECTION

The following section summarizes systemic safety improvement countermeasures considered for this LRSP, risk factors, crash modification factors (CMFs), and countermeasures considered for inclusion in the LRSP. Additional information is provided summarizing the driver-related countermeasures underway within the county.

5.1. Potential Systemic Safety Improvement Countermeasures

The purpose of the LRSP project is to identify systemic safety improvements that can be implemented on county roads. The systemic approach takes a broad view of risk, examining it across an entire roadway system, rather than applying improvements to locations where crashes have previously occurred.

5.2. Risk Factors

When developing systemic safety improvements, it is important to note potential risk factors associated with the crash types. The FHWA, as part of their Systemic Safety Project Selection Tool, has developed a list of potential risk factors that can help identify locations for systemic safety improvements. While not all the risk factors outlined below are utilized for the LRSP project due to data availability and crash types to be addressed, they have been included below for reference.

- Roadway and Intersection Features
 - Number of lanes
 - Lane width
 - Shoulder surface width and type
 - Median width and type
 - Horizontal curvature, superelevation, delineation, or advance warning devices
 - Horizontal curve density
 - Horizontal curve and tangent speed differential
 - Presence of a visual trap at a curve or combinations of vertical grade and horizontal curvature
 - Roadway gradient
 - Pavement condition and friction
 - Roadside or edge hazard rating (potentially including sideslope design)
 - Driveway presence, design, and density
 - Presence of shoulder or centerline rumble strips
 - Presence of lighting
 - Presence of on-street parking
 - Intersection skew angle
 - Intersection traffic control device

“The systemic approach to safety involves widely implemented improvements based on high-risk roadway features correlated with specific severe crash types. The approach provides a more comprehensive method for safety planning and implementation that supplements and complements traditional site analysis. It helps agencies broaden their traffic safety efforts and consider risk as well as crash history when identifying where to make low cost safety improvements.”
FHWA – Office of Traffic Safety



- Number of signal heads vs. number of lanes
- Presence of backplates
- Presence of advanced warning signs
- Intersection located in or near horizontal curve
- Presence of left-turn or right-turn lanes
- Left-turn phasing
- Allowance of right-turn-on-red
- Overhead versus pedestal-mounted signal heads
- Pedestrian crosswalk presence, crossing distance, signal head type
- Traffic Volume
 - Average Daily Traffic volumes (ADT)
 - Average Daily Entering Vehicles (DEV)
 - Proportion of commercial vehicles in traffic stream
- Other Features
 - Posted speed limit or operating speed
 - Presence of nearby railroad crossing
 - Presence of automated enforcement
 - Adjacent land use type (e.g., schools, commercial, or alcohol-sales establishments)
 - Location and presence of bus stops

5.3. Crash Modification Factors (CMFs)

When identifying potential systemic safety improvements, it is important to look at CMFs for the proposed improvements. The CMF Method is found in Part D of the HSM. CMFs are defined as the ratio of effectiveness of one condition in comparison to another condition and represents the relative change in crash frequency due to a change in one specific condition. In other words, a CMF is a multiplicative factor used to compute the expected number of crashes after implementing a given countermeasure at a specific site. Countermeasures with CMFs less than one are expected to reduce crashes if applied, while those countermeasures with CMFs greater than one are expected to increase crashes. **Figure 15** illustrates the definition of CMFs.

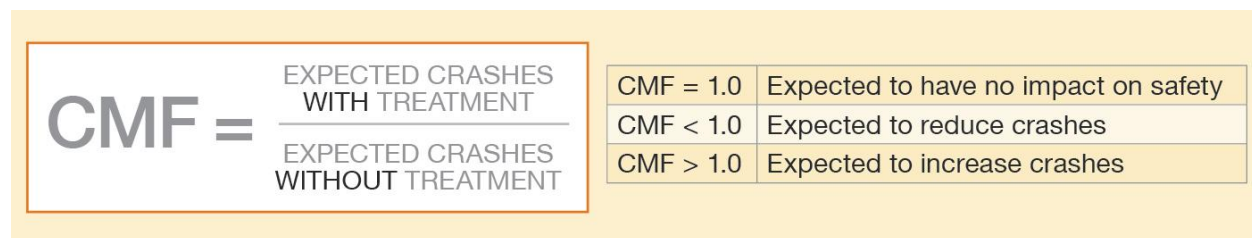


Figure 15 – CMF Calculation

The CMF Method is used to calculate the expected number of crashes by taking the observed number of crashes and multiplying those crashes by the applicable CMF for the proposed countermeasure. It is recommended that CMFs be applied to a minimum of three years of crash data for urban and suburban sites and five years of crash data for a rural site. **Figure 16** is a sample calculation of the CMF method with one CMF being applied to a particular site for a single year.

10.1 crashes / year x 0.91 (CMF) =	9.2 crashes / year: a reduction of 0.9 total crashes per year and a CRF of 9%
------------------------------------	--

Figure 16 – CMF Method Sample Calculation

A Crash Reduction Factor (CRF) is similar to a CMF but stated in different terms. A CRF is defined as a percentage of crash reduction that might be expected after the implementation of a given countermeasure at a specific site. **Figure 17** shows how a CRF is calculated in relationship to a CMF.

$$CRF = (1 - CMF) \times 100$$

Figure 17 – CRF Calculation

Caution should be used in the selection of appropriate CMFs. The following guidance should be considered when selecting CMFs:

- CMFs should be selected from the HSM Part D or from FHWA's CMF Clearinghouse website (<http://www.cmfclearinghouse.org>).
- Read the countermeasure abstract to determine if the CMF is applicable to the proposed improvement.
- Only CMFs with a four-star rating or higher should be considered for use in analysis.
- Be sure the selected CMF is applicable to the set of crash data being used for analysis. Some CMFs may only be applicable to a subset of the crash data.
- The application of multiple CMFs can overestimate the expected crash reduction. Unless each CMF addresses independent crash types, multiple CMFs should not be used. It is suggested that no more than three independent CMFs be applied to a particular site.

5.4. Engineering Countermeasures

In **Section 6** of this report countermeasures are discussed and detailed in **Appendix B1**, **Appendix C1** and, **Appendix D1**. CMFs are also provided for countermeasures in this report when four-star or five-star CMFs are available. In some cases, CMFs are not available for particular countermeasures because sufficient data has yet to be collected, but the countermeasures are still believed to result in crash reductions. In other cases, the countermeasure is a proven FHWA countermeasure and the CMFs vary significantly based on the existing and proposed conditions. CMFs provided within this report were identified from the FHWA's CMF Clearinghouse (www.cmfclearinghouse.org) and are referenced in this report for information only to show the general benefit of the recommended countermeasures.

During Phase 1 and Phase 2 of the LRSP project, the project team worked with 29 counties and the Iowa DOT to identify potential safety engineering countermeasures related to paved roadway segments, intersections, and curves. Additional countermeasures were identified during the District Road Safety Plan process that are incorporated into this project. The following sections summarize the proposed safety countermeasures for the county's LRSP.



5.4.1.1. County Paved Roadway Segment Countermeasures

The following roadway segment safety countermeasures were identified:

- Conduct an RSA
- Conduct an access control evaluation
- Wider pavement markings
- Improved pavement markings
- Shoulder width increase
- Safety edge
- Edgeline rumble strips
- Centerline rumble strips
- Install/enhance curve chevron, advanced curve warning, and advisory speed signs
- Remove obstructions within right-of-way (clearing and grubbing)
- Improve sight distance (clearing and grubbing)
- Flatten and widen foreslopes *
- On-pavement markings for speed control *
- Delineate roadside hazards (trees of utility poles) with retroreflective strips *
- Use of guardrails *
- Install post-mounted delineators*
- Install retroreflective strips on chevron sign posts *
- Transverse rumble strips prior to curves *
- Remove/relocate objects in hazardous locations *
- Superelevation correction on curves *
- Install High Friction Surface Treatment (HFST) on curves *
- Speed-activated flashers on chevron signs *
- Duplication of signage*
- Improved lighting *
- Improve access management (driveway policy) *
- Conduct speed studies *
- Modify lane width *

5.4.1.2. County Paved Intersection Countermeasures

The following paved intersection safety countermeasures were identified:

- Coordinate with local jurisdiction on signal modifications
- Signal warrant analysis to consider removal of signal
- Intersection Configuration Evaluation (ICE)
- Implement the results of ICE
- All-way stop analysis to convert two-way stop to all-way stop or remove stop signs
- Install destination lighting
- Increase size and/or retroreflectivity of stop signs
- Duplication of signage
- Wider pavement markings
- Improve pavement markings
- Flashing beacons on stop/yield signs
- Transverse rumble strips
- Install intersection warning signs and advanced street name plaques
- Improved sight distance (clearing and grubbing)
- Provide right-turn and/or left-turn lanes *
- Realign intersection approaches to reduce or eliminate intersection skew *
- Provide bypass lane on shoulder at T-intersections *
- Convert offset T-intersections to four-legged intersections *
- Use indirect left-turn treatments to minimize conflicts at divided highway intersections *
- Convert four-legged intersections to offset T-intersections *
- Flashing beacon on intersection warning signs *
- Stop signs with LED flashing lights



- Low-cost Intersection Conflict Warning Systems (ICWS) *
- Install a roundabout *
- Shoulder width increase *
- Safety edge *
- Use of retroreflective markers for trees or utility poles *
- Use of guardrails *
- Install retroreflective strips on stop sign posts *
- Access management *

5.4.1.3. County Paved Curve Countermeasures

The following horizontal curve safety countermeasures were identified:

- Wider pavement markings
- Shoulder width increase (paved)
- Safety edge
- Edgeline rumble strips
- Centerline rumble strips
- Install/enhance curve chevron signs
- Provide advance warning signage
- Remove obstructions within right of way (clearing and grubbing)
- Additional curve signage *
- Install retroreflective strips on chevron sign posts *
- Transverse rumble strips prior to curve *
- Superelevation correction *
- Install HFST on curves *
- Speed-activated flashers on chevron signs *
- Use of guardrails *
- On-pavement markings for speed control *
- Install post-mounted delineators *
- Use of retroreflective markers for trees or utility poles *
- Enhanced delineation and horizontal friction *

* Upon consultation with the Phase 1 and Phase 2 counties and the Iowa DOT, these countermeasures were determined to not be implemented at a systemic level; however, they should still be considered on a case-by-case basis by the County Engineer depending on the specific issues at a particular location and many have been provided on the back side of the project sheets.

5.4.1.4. Additional Potential Countermeasures

The back side of the project sheets includes additional potential countermeasures for consideration by the County Engineer. For each location, there are a variety of other safety improvements that could be considered even though they were not recommended as part of this project due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. These additional countermeasures are discussed in **Section 6.2.6.**, **Section 6.3.6.**, and **Section 6.4.6.**



5.5. Driver-Related Countermeasures

A workshop was conducted in Webster County on Monday, November 6, 2017, to discuss driver-related countermeasures and project selection. Representatives at the workshop included:

- Randy Will (Webster County Engineer)
- Dale Anderson (Webster County)
- Nick Carlson (Webster County)
- John Cooper (Trinity Regional Medical Center)
- John Garretson (Trinity Regional Medical Center)
- Larry Grant (GTSB)
- Dale Iles (Webster County)
- Jamie Johl (Webster County)
- Mark Miller (Iowa State Patrol)
- Dan Nelson (Motor Vehicle Enforcement)
- Terry Ostendorf (Iowa DOT)
- Jim Stubbs (Webster County Sheriff)
- Bob Thode (Webster County)



The 2013 Iowa SHSP has ten Key Safety Emphasis Areas, of which six are driver-related emphasis areas:

- Speed-related
- Unprotected persons
- Younger drivers
- Impaired driving
- Older drivers
- Inattentive/distracted driving

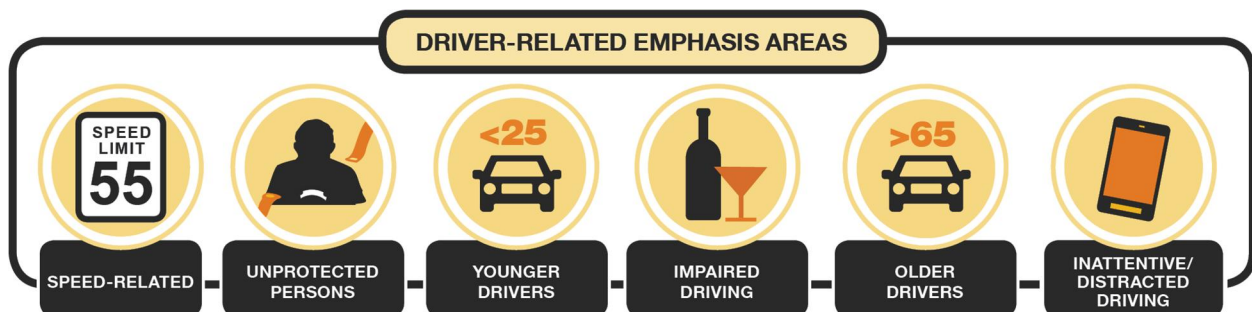


Figure 18 – Iowa SHSP Driver-Related Emphasis Areas

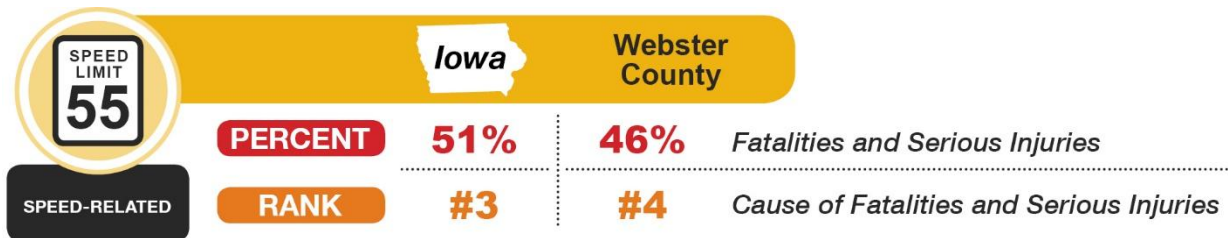
During the workshop, attendees were provided information regarding fatal and serious injury crashes within the county and how that data aligned with the Iowa SHSP Key Safety Emphasis Areas. Potential countermeasures from the *NCHRP Report 500 Series, Toward Zero Deaths*

documents, and the results from Phase 1 and 2 of the LRSPs were provided to stakeholders to facilitate discussion on what action items were currently underway in the county with respect to driver-related crashes.

The following statuses of implementation for the various driver-related countermeasures were defined based on the results of the discussion at the county workshop:

- Underway/Ongoing (currently being done);
- Area for Improvement (ongoing, but could be enhanced);
- Opportunity (not being done, but could be implemented); or
- Completed in the Past (has been completed in the past, but not planned to be implemented in the future).

The following sections provide a summary of the status of implementation of the driver-related countermeasures within the county. It is recommended that the county continue to implement countermeasures that are currently underway/ongoing, and look for additional opportunities to implement countermeasures that are not currently being implemented. This will require input from and coordination with all of the five E's of safety.



5.5.1.1. Speed-Related

Speed-related crashes are a common concern within all the LRSP Phase 3 counties, and account for half (51%) of fatal and serious injuries across the state of Iowa. Many counties are facing budgetary constraints which limit the number of officers available to proactively conduct speed enforcement. Some counties stated that they could provide better enforcement with their available resources if speeding locations were identified on a map and/or if a speed trailer with the ability to log speed data by time of day and day of week were available to them. There is a common opportunity to provide an educational campaign with respect to speed-related crashes.

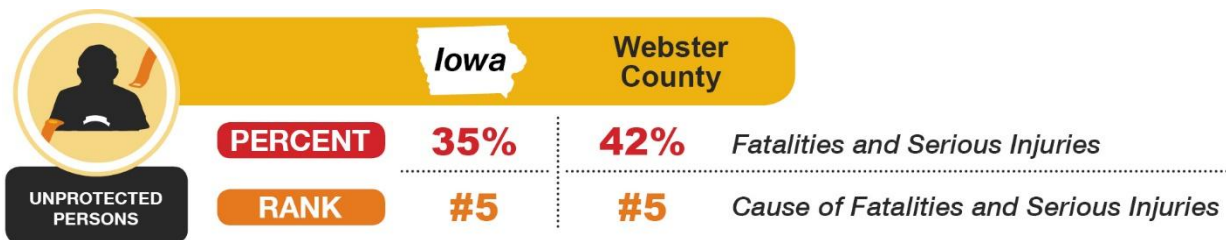
A topic of discussion in many of the workshops involved drivers illegally passing school buses. While law enforcement in most counties are ticketing drivers for illegally passing school buses, it is unclear whether or not the Keep Aware Driving – Youth Need School Safety Act (Kadyn's Law) is being implemented in the court system. This law states that driving privileges will be suspended for 30 days for a first conviction, 90 days for a second conviction, and 180 days for a third or subsequent conviction along with fines.

Speed-related crashes resulted in 61 (46%) of the fatalities and serious injuries in Webster County. Both Fort Dodge and Gowrie participate in GTSB funding through the sTEP. Currently, targeted speed enforcement based on crash data is not taking place within the county, but some enforcement is based on public input and requests. Barnum has a portable speed trailer that they loan to different neighborhoods. Since most school buses within the county do not have exterior cameras, there was discussion on having officers ride in the buses on occasion and write tickets. **Table 5** provides a summary of the level of implementation of speed-related countermeasures in the county.



Table 5 – Speed-Related Countermeasure Implementation Status

Countermeasure	Status
Conduct targeted speed enforcement <ul style="list-style-type: none"> - Opportunity to conduct targeted enforcement based on knowledge of the county and/or crash history. - Opportunity to participate in Governor's Traffic Safety Bureau (GTSB) funding through the special Traffic Enforcement Program (sTEP) program. 	Opportunity
Prosecute and impose sanctions on drivers not obeying school bus stop bars <ul style="list-style-type: none"> - Consider having officers ride in buses and write tickets. - Prosecution of offenses is unclear. 	Opportunity
Conduct education and awareness campaigns	Opportunity



5.5.1.2. Unprotected Persons

Many counties have seat belt compliance rates over 90%; however, unprotected persons still comprise more than one-third (35%) of the fatalities and serious injuries on Iowa roads. Most counties have at least one location within their community for instruction on proper child restraint use; however, there are opportunities to conduct “child restraint inspections and/or installation” events either individually or as part of a larger community event, such as the county fair, a safety fair, or a Fire Department open house. Additionally, counties could provide training to middle school children potentially through the Drug Abuse Resistance Education (DARE) program.

Several counties have trained law enforcement to check for proper child restraints and provide them with a “cheat sheet” to keep in their vehicle so they are aware of the current laws. Marshall County is in the process of developing a program where individuals who are cited for providing improper child restraint can attend a course on proper child restraints in lieu of paying the fine. A program such as this could provide valuable education on proper child restraints that can improve safety within Webster County as well.

Multiple counties have programs where law enforcement or emergency medical service personnel (EMS) pass out ice cream certificates, pizza certificates, or candy to children wearing their helmets while riding their bikes. **Figure 19** shows some examples of certificates given out by Monroe County for bicycle helmet use. In Fort Dodge, law enforcement officers have given out cash to those wearing seat belts in the past. It is important to note that since helmets are not required for motorcyclists in Iowa, there is little to no effort put forth to educate citizens on the importance of wearing a helmet when riding a motorcycle.



Source: Monroe County, IA

Figure 19 – Example Bicycle Helmet Reward Coupons

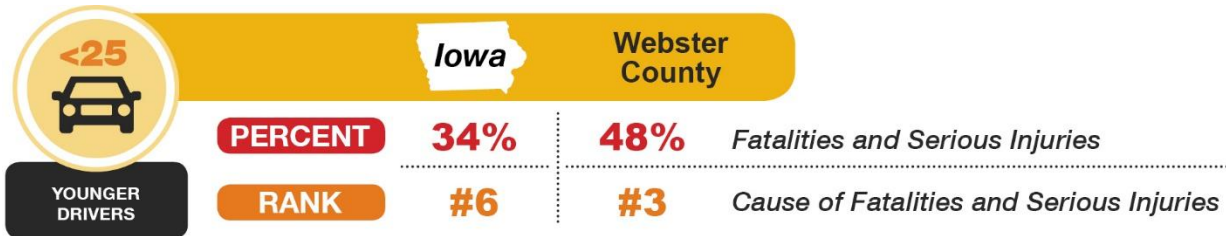
Unprotected person crashes resulted in 56 (42%) of the fatalities and serious injuries in Webster County. Fort Dodge and Gowrie conduct targeted enforcement as part of sSTEP. Within the county, violations are cited, but there are not any specific targeted enforcement activities. There is a child restraint inspection event on the last Tuesday of the month at the local car dealership. In addition to inspecting child restraints, GTSB flyers for car seats are handed out to attendees. The certified Child Passenger Safety Technicians (CPSTs) also attend other events, such as National Night Out and the Health and Safety Day at the local shopping center. Parents are also able to go to the hospital to have child restraints inspected and there are four certified CPSTs at the hospital.

Law enforcement noted that when they are asked to speak at events, they talk to children about buckling up and making sure they are using the proper restraints.

As part of a positive reinforcement campaign, the Fort Dodge Police Department was handing out \$20 bills for those wearing their seat belt. The funding came from “Crime Stoppers.” A summary of unprotected persons countermeasure implementation in the county is included in **Table 6**.

Table 6 – Unprotected Persons Countermeasure Implementation Status

Countermeasure	Status
Conduct targeted enforcement of restraint use <ul style="list-style-type: none"> - Most targeted enforcement occurs through the sSTEP program at the city-level. 	Area for Improvement
Instruction in proper child restraint use <ul style="list-style-type: none"> - There are locations in the county where child restraints can be inspected. - Regularly scheduled events for child restraint inspection. - The hospital has someone available to inspect child restraints. 	Underway/Ongoing
Check for proper child restraint use in all motorist encounters <ul style="list-style-type: none"> - Officers are told to check for proper child restraint use. 	Underway/Ongoing
Positive reinforcement <ul style="list-style-type: none"> - Fort Dodge hands out \$20 bills for those wearing their seat belt. 	Underway/Ongoing
Conduct education and awareness campaigns	Opportunity



5.5.1.3. Younger Drivers

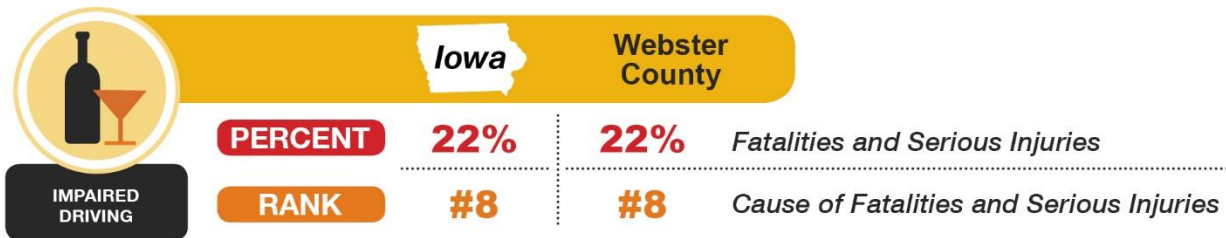
Crashes involving younger drivers account for more than one-third (34%) of fatalities and serious injuries in Iowa. In counties where driver's education is still taught through the high schools, there is an opportunity for law enforcement to participate and provide training on targeted topic areas such as distracted driving, impaired driving, and seatbelt use. In locations where driver's education is privatized, it can be more difficult for law enforcement to become involved in additional training during driver's education courses.

Although schools have strict curricula to adhere to, there is still the opportunity for education with respect to younger drivers' issues such as "don't veer for deer"; texting and driving; what to do on an edge drop-off; etc. to occur through health classes or other programs within the schools. Many schools are participating in mock prom disaster events to raise awareness of impaired and distracted driving. It is important to note that counties can apply for TEAP funding to obtain assistance in reviewing traffic/safety issues around existing school sites.

Younger driver crashes account for 64 (48%) of the fatalities and serious injuries in Webster County. In the past, there was a mock prom disaster that was conducted in the schools, but the person who organized it is no longer with the hospital. Iowa Central now provides driver's education for their younger drivers. Now that driver's education is no longer in the schools, The Sheriff's Office is not asked to speak to the classes. Officers are often invited into classes to speak to students about various safety topics; however, it is not a standard event and not always related to driver safety. **Table 7** provides a summary of the level of implementation of younger driver-related countermeasures in the county.

Table 7 – Younger Drivers Countermeasure Implementation Status

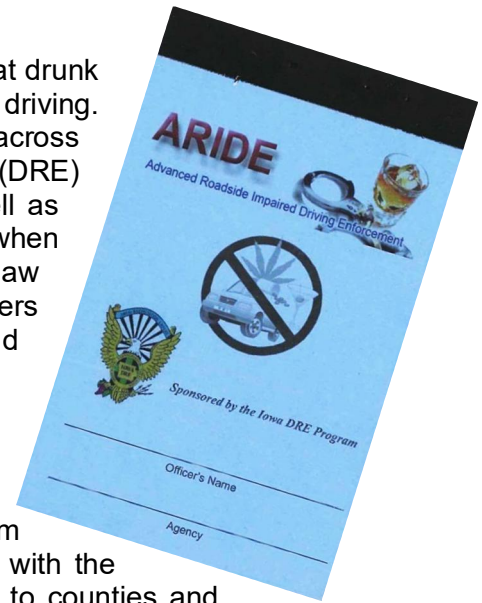
Countermeasure	Status
Enforcement of graduated driver's license laws	Underway/Ongoing
Mock prom disaster events - Mock prom disaster/crash events have been conducted in the past.	Completed in the Past
Additional training in schools - Opportunity for individual teachers of health, physics, or other classes. - Governor's Traffic Safety Bureau (GTSB) has a simulator that can be used at events. - "Drunk goggles" can be used as part of after prom.	Opportunity
Conduct education and awareness campaigns	Opportunity



5.5.1.4. Impaired Driving

During the workshops, many counties noted that, while they felt that drunk driving was on the decline, there has been an increase in “drug” driving. Impaired driving accounts for 22% of fatalities and serious injuries across the state. Most counties have access to a Drug Recognition Expert (DRE) to assist in determining intoxication in routine traffic stops as well as crashes. Some counties noted the difficulty in reaching DREs when needed. GTSB can provide ARIDE training for interested law enforcement officers. ARIDE is a course designed such that officers become more proficient at detecting, apprehending, testing, and successfully prosecuting impaired drivers.

Most counties proactively conduct OWI enforcement, and some counties receive GTSB grants for additional targeted enforcement. Over the years, some counties have conducted safety checkpoints. Safety checkpoints require a significant amount of resources from multiple jurisdictions, thus making them more difficult to conduct with the limited resources available. GTSB has a trailer that is available to counties and contains all of the supplies required to conduct a safety checkpoint.



In multiple workshops the topic of repeat OWIs was discussed. It was mentioned that prosecuting and imposing sanctions on OWI offenders can be difficult and, that at times, second and third offenses were being recorded as first and second offenses. Workshop attendees voiced the concern that considerable discretion is given to the County Attorney for plea bargains and diversion programs in order to manage caseloads.

In Muscatine County, they allow OWI offenders to perform manual labor as part of an alternative sentencing program. More information on the program can be found on the county website: <http://www.co.muscatine.ia.us/159/Alternative-Sentencing> and could be considered in Webster County.

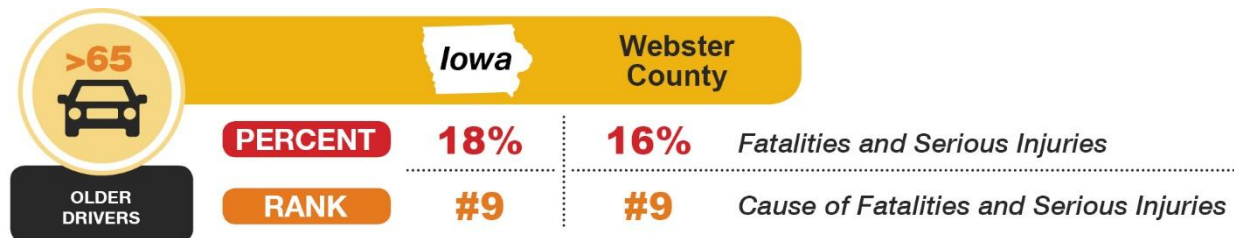
Another idea for helping rehabilitate OWI offenders that has been successfully implemented in other states is the “24/7 Sobriety Program.” More information on the current program in South Dakota is available at: <https://atg.sd.gov/legal/DUI247/default.aspx>. With the support of its county officials, Woodbury County was recently selected to pilot the program in Iowa.

Impaired driving crashes account for 29 (22%) of the fatalities and serious injuries in Webster County over the study period. Targeted enforcement occurs around the “Night Ride” event. Safety checkpoints have not been completed in the county for years, but the possibility of using fire department volunteers to assist with the logistics and manpower for a checkpoint was discussed. A summary of the impaired driving countermeasures discussed during the workshops along with the county’s level of implementation is included in **Table 8**.



Table 8 – Impaired Driving Countermeasure Implementation Status

Countermeasure	Status
Conduct targeted Operating While Intoxicated (OWI) enforcement <ul style="list-style-type: none"> - Targeted OWI enforcement is conducted during the “Night Ride” event. - OWIs seem to occur all over the county. 	Underway/Ongoing
Conduct safety checkpoints <ul style="list-style-type: none"> - Governor’s Traffic Safety Bureau (GTSB) has a trailer with needed materials that can be used. - Possibility to use volunteer fire department to help with logistics and manpower. 	Opportunity
Compliance checks for alcohol sales <ul style="list-style-type: none"> - Underage compliance checks are conducted on alcohol retailers and bars. - Over-serving compliance checks are an opportunity. 	Underway/Ongoing, Opportunity
Alternative transportation choices <ul style="list-style-type: none"> - Taxis are available within the county. 	Underway/Ongoing
Prosecute, impose sanctions on, and treat OWI offenders <ul style="list-style-type: none"> - County Attorney allows for plea bargains on OWIs. 	Area for Improvement
Conduct education and awareness campaigns	Opportunity



5.5.1.5. Older Drivers

Older driver crashes accounted for 18% of fatalities and serious injuries statewide. The counties mentioned that engineering countermeasures such as larger text, signs, and advanced intersection signage could be useful for older drivers. Law enforcement in many of the counties do recommend retesting for driver’s licenses when older drivers are involved in a citation or at fault in a crash, but at times this can be difficult as some County Attorney’s Offices are concerned about profiling. Retesting is successfully being implemented in many counties in situations where older drivers were at fault in a crash or as a result of a traffic stop. However, law enforcement in several counties noted that even when older drivers lose their driver’s license, they still tend to drive due to the rural nature of the state and their need to access services. Older drivers are a consistent issue as driving is considered a form of independence that can be difficult to deny for life-long rural drivers.

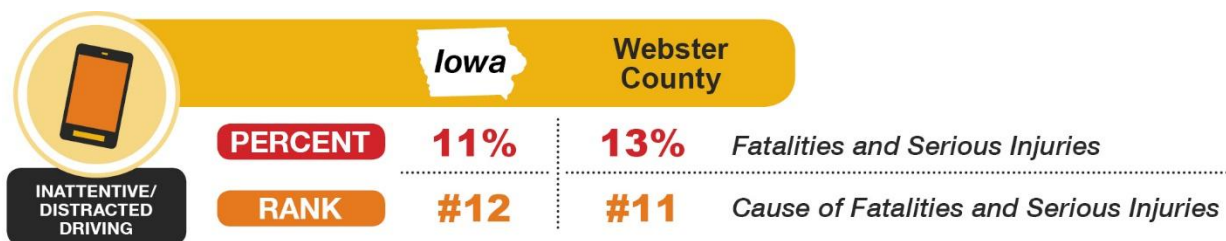
In several counties, law enforcement noted a high percentage of older drivers on the roads during severe weather because they were following their daily routine regardless of the weather. There are opportunities to use local radio/TV stations to raise awareness of adverse weather conditions when drivers (particularly older drivers) should not drive. General weather/driving education could be given through community centers as well.

The Iowa DOT Office of Driver Services is sponsoring events through the CarFit program, helping older drivers with the “fit” of their vehicle. This program could be an opportunity for the county.

Older driver crashes resulted in 22 (16%) of the fatalities and serious injuries in Webster County. A summary of older driver countermeasure implementation by the county is included in **Table 9**.

Table 9 – Older Driver Countermeasure Implementation Status

Countermeasure	Status
Promote safe mobility choices <ul style="list-style-type: none"> - Opportunity to provide paratransit service materials at locations throughout the county. - Opportunity to use the Farm Bureau, veterans’ groups, AARP, etc. to communicate transportation options to older drivers. 	Opportunity
Encourage external reporting of at-risk drivers to licensing authorities <ul style="list-style-type: none"> - Law enforcement request retesting of drivers as appropriate. 	Underway/Ongoing
Conduct education and awareness campaigns	Opportunity



5.5.1.6. Inattentive/Distracted Driving

During the workshops, it was noted that inattentive/distracted driving was most likely largely underreported, as it is difficult for law enforcement to determine what events specifically led to the crash. Workshop attendees noted that as cell phone coverage increases in rural areas, drivers using their cell phones will most likely increase. In April 2017, Iowa passed legislation making it illegal, and a primary offense while driving to use a mobile device to “write, send, or view an electronic message”, or “play, browse, or access electronic messages”. Phone calls and using navigation on a cell phone are still permitted under this legislation. It was noted in the workshops that even with this new legislation, compliance is difficult to enforce. Also, the crash forms used by law enforcement were recently modified to include more options specific to distracted driving; in the future, it is anticipated that data quality will improve.

There are opportunities to conduct education and awareness campaigns with respect to inattentive/distracted driving, either through schools, social media, radio, or TV. The City of Waterloo (located in Black Hawk County) is currently using TSIP funding for driver safety awareness campaigns, and Webster County could apply for these funds as well.

The Cerro Gordo County Sheriff utilized the distracted driving video simulator from *It Can Wait* at their county fair. According to the Sheriff, it was very popular, easy to use, and they are looking for opportunities to utilize similar simulators at future events. The simulator was a free download from the website, and all that was needed was a video game steering wheel, cell phone, and laptop. A similar simulator can be found at: <https://www.itcanwait.com/vr>. GTSB also has a simulator that can be used for events, free of charge.



Inattentive/distracted driving crashes resulted in 18 (13%) of the fatalities and serious injuries in Webster County. Attendees noted that it is difficult to enforce the existing cell phone laws. The county has a policy relating to cell phones and driving, but attendees thought it needed to be updated. GTSB has sample policies and can help with updating the policy. **Table 10** summarizes the implementation status of the inattentive/distracted driver countermeasures as recorded in the workshop in the county.

Table 10 – Inattentive/Distracted Driving Countermeasure Implementation Status

Countermeasure	Status
Visibly enforce existing statutes to deter distracted driving	Opportunity
Agency policy for hands-free devices <ul style="list-style-type: none">- Opportunity to revise county policy.- Governor's Traffic Safety Bureau (GTSB) has sample policies for guidance.	Opportunity
Mobile simulator for distracted driving <ul style="list-style-type: none">- GTSB has a mobile simulator that can be used, free of charge.- Various downloadable simulators are available online.	Underway/Ongoing
Conduct education and awareness campaigns <ul style="list-style-type: none">- Iowa DOT's "Message Mondays" can also be shared.	Opportunity



6. SAFETY PROJECT DEVELOPMENT

Safety improvement projects were developed at high-priority locations along paved roadway segments, intersections, and horizontal curves within the county. Due to the limited amount of available data, low traffic volumes, and limitations on the types of systemic safety improvement projects that can be implemented on unpaved roads, location-specific recommendations were not developed for unpaved roadways. However, this LRSP includes safety recommendations that can be considered for implementation on the unpaved roadway system by the County Engineer.

This section describes the methodology of data analysis for project selection and prioritization for safety improvement projects for paved roadway segments, intersections, and horizontal curves.

6.1. Methodology

As shown in **Figure 20**, GIS data, as described in **Section 3**, was utilized to rank each of the county paved roadway segments, intersections, and curves based on risk factors. After the facilities were ranked, a decision tree was used to develop safety improvement recommendations along the facilities with the highest risk factor rankings. Draft project sheets for the highest-ranking facilities were developed summarizing the recommendations and estimated implementation costs for the project recommendations. The project sheets were provided to the county for review and comment, then finalized. Each of the methodology steps is described in detail in the following sections.

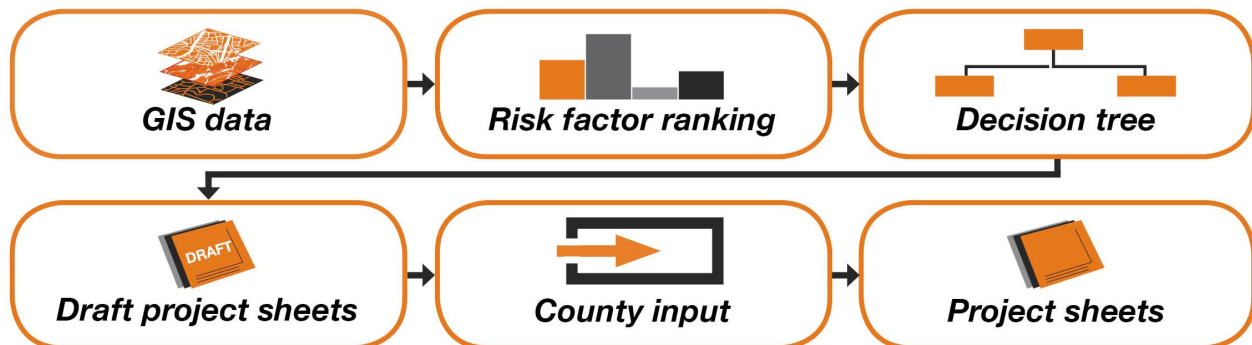


Figure 20 – Project Analysis Methodology

6.1.1. GIS Data

GIS data for the county paved road segments, intersections, and curves was utilized to perform a systemic analysis of the county-owned roadway facilities. Databases were obtained through collaboration and coordination with Iowa DOT, InTrans, and the county. Descriptions of the databases utilized for the analysis are included in **Section 3** of this document.

Once obtained, the data was analyzed using ArcMap GIS software as described in the following sections. Every roadway segment, intersection, and curve along the county-owned paved roadway system was analyzed.

6.1.2. Risk Factor Ranking

Iowa DOT crash data from 2007 to 2016 (as of the May 15, 2017 database update) was utilized for analysis. This represents the most recent 10 years of crash data available at the time this project phase began. Risk factors along roadway segments, at intersections, and along curves were assessed to determine locations that may be more susceptible to crashes involving serious



injuries and/or fatalities in the future, as opposed to focusing only on locations that have had such crashes previously. In this analysis, various attributes were assessed in determining risk. The attributes that were assessed for determining risk are included in the subsequent sections for segments, intersections, and curves. Rankings of those attributes were developed for the LRSP in coordination with the Iowa DOT.

6.1.3. Project Selection Decision Tree

To aid in the systematic selection of safety improvement recommendations for the roadway segments, intersections, and curves with the highest risk factor rankings, three project decision trees were developed. A decision tree was developed for each facility type and are individually described in subsequent sections. A logical flow was created within the decision trees based on traffic volumes and roadway characteristics. Facility data was utilized to select which safety countermeasures (projects) were recommended at each location.

6.1.4. Draft Project Sheets

To summarize the information used in the analysis of the roadway segments, intersections, and curves within the county, individual project sheets were developed for those facilities with the highest risk scores. The draft project sheets included location, systematic ranking data, crash data, geometric data, and opinion of probable cost for the recommended safety improvements. **Figure 21** summarizes the general organization of and information contained within the project sheets.

6.1.5. Driver-Related Countermeasure and Project Selection Workshop

After development of the potential location-specific safety improvements and project sheets, an in-person workshop was conducted in Webster County on Monday, November 6, 2017, to review implementation of the driver-related countermeasures along with the engineering safety countermeasures that were recommended for specific locations on the draft project sheets.

6.1.6. Project Sheets

After addressing the comments from the county, the project sheets for segments, intersections, and curves were finalized. The project sheets included in **Appendix B2**, **Appendix C2**, and **Appendix D2** are based on the best available information as of November 2017.

PROJECT SHEET LAYOUT

Project Location and County Contact Information

Location of Project with respect to County, on a Zoomed in Map, and Aerial of Project Location

Summary of Systemic Ranking for the Location

Local Road Safety Plan
Project Description for Intersection Improvements

Project Name:
Agency Name:
Contact Name:
E-mail:

Risk Factor Points: **10**

Date: 9/22/16

Prepared By: DJG/DVM
Checked By: MMO

Location Description

Road: _____ Closest City: _____ GPS ID: 558644

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps

Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Daily Entering Vehicles	753	6
Distance from Previous Stop	7.5 mi	4
Approach Angle (Degrees)	90	0
Intersection within Curve	0	0
Roads/Driveways within 250 Feet	0	0
K or A Crashes	0	0
Total Risk Factor Points (22 max)		10

Other Information	Value
Number of Approaches	4
Number of Paved Approaches	3
Major ADT	500
Minor ADT	410
Destination Lighting	No
Transverse Rumble Strips (Number of Approaches)	1
Control Type	Two-way stop

Crash Data, 2006-2015	Value
Total Crashes	0
K and A Crashes	0
Right Angle, Rear-end or Turning Crashes	0
Total Nighttime Crashes	0
Nighttime/Daytime Crash Ratio*	0.0

Key Emphasis Area
Intersections
Local Roads

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	\$ 2,500	\$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	\$ 5,000	\$ -
Intersection Configuration Evaluation (ICE)	0	EA	\$ 25,000	\$ -
Implement Results of ICE	0	EA	\$ 750,000	\$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	\$ 5,000	\$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	\$ 5,000	\$ -
Install Destination Lighting	1	LEG	\$ 8,000	\$ 8,000
Upgrade Signs and Pavement Markings	1	LEG	\$ 2,200	\$ 2,200
Upgrade Signs (Unpaved Approaches)	1	LEG	\$ 1,000	\$ 1,000
Install Second Stop Sign and Stop Ahead Sign	2	LEG	\$ 1,200	\$ 2,400
Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	\$ 2,500	\$ -
Install Transverse Rumble Strips	0	LEG	\$ 1,000	\$ -
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	2	LEG	\$ 1,200	\$ 2,400
Clear and Grub within Sight Triangle	4	LEG	\$ 1,500	\$ 6,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 22,000

Continued on back of this page.

Icon Displaying Project Type and Road Classification

Unique GPS Identification Number

Crash Data

Key Emphasis Area Crashes that the Project is Anticipated to Address (from the Iowa SHSP)

Other Information at this Location that is Important for Selecting the Recommendations within the Decision Tree

Cost Estimate

Figure 21 – Project Sheet Summary

6.1.6.1. Project Recommendations Disclaimer

The recommended improvements contained in the project sheets were developed through a system-wide GIS database risk assessment and project decision tree selection process, as described previously. Kimley-Horn could not confirm or control the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. Site surveys were not conducted at the specific locations detailed in the project sheets. The County Engineer may use these project sheets as part of due diligence, but these project sheets should not be used as the sole basis for the County Engineer's decision-making. The County Engineer can make changes to the prepared project sheets using individual discretion. Kimley-Horn endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule of the project. This assessment is based in large part on information provided by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided. The project sheets

PREPARED BY: Kimley-Horn

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included in **Appendix B2**, **Appendix C2**, and **Appendix D2** are based on the best available information as of November 2017.

6.2. Segments

The methodology described in **Section 6.1** was followed for county-wide analysis of roadway segments based on the determined risk factors.

The road segment limits were determined based on relevant roadway attribute changes along a roadway including pavement width, shoulder width, and street name.

6.2.1. Risk Factor Summary

Each county paved road segment was assigned risk factor points based on the following seven roadway attributes:

- **Traffic Volume (ADT):** the daily average number of vehicles along the roadway segment. The ADTs for all the segments within the county were compared against each other to assign higher risk factor points to segments with higher ADTs within the county.
- **Pavement and Shoulder Width:** the width of pavement and shoulders were used to assign risk factor points to each segment. Segments with narrower pavement and shoulder widths were assigned more risk factor points. **Table 11** further describes the amount of points assigned for various width combinations.
- **Roadside Hazards:** the average roadside hazard rating from both sides of the road for the length of the segment. Segments with higher roadside hazard ratings, as collected using usRAP procedures (see **Section 3.2.5.**), received higher risk factor points.
- **Access Density:** risk factor points were assessed based on the number of driveways and/or intersections per mile. Segments with higher access densities were assigned more points.
- **Curve Density:** the number of curves per mile with a radius less than 1,000 feet and with a length greater than 100 feet. Segments with a higher curve density were assigned more risk factor points.
- **Pavement Condition:** the average of the recorded roughness indices for the length of the segment. Segments with an IRI value over 95 could potentially cause safety concerns and were assigned risk factor points. Per the FHWA, roadways with IRI values less than 95 are considered “good” condition, 95-170 are “acceptable”, and less than 170 are “poor”. Risk factor points were assigned to roadways with acceptable or poor ratings. Research has shown that a rougher ride can contribute to loss of control of a vehicle, particularly when braking or turning.
- **Crash Experience:** the number of lane departure crashes for each segment in the county was reviewed to assign risk factor points to segments where there was a history of lane departure crashes.

Recommendations were only made where segments were greater than 0.5 miles in length and where the posted speed limit was 40 miles per hour (mph) or higher. This was agreed upon based on the nature of the recommendations, which are more applicable to rural roadway segments, and to provide segments of sufficient length to justify mobilization of construction/maintenance crews and equipment.

Table 11 summarizes the risk factors used as well as the points developed in coordination with the Iowa DOT. As can be seen, the maximum number of available points for roadway segment risk was 23 points.

Table 11 – County Paved Roadway Segments – Risk Factor Ranking

Risk Factor	Measurement	Points	Max Points Available
Traffic Volume	Average Daily Traffic (ADT)	0: ADT percentile is 0%-14.3%	6
		1: ADT percentile is 14.3%-28.6%	
		2: ADT percentile is 28.6%-42.9%	
		3: ADT percentile is 42.9%-57.1%	
		4: ADT percentile is 57.1%-71.4%	
		5: ADT percentile is 71.4%-85.7%	
		6: ADT percentile is 85.7%-100%	
Pavement and shoulder width	Pavement and shoulder width in feet (ft)	0: Pavement width ≥ 22 ft and shoulder width ≥ 2 ft	4
		0: Pavement width > 18 ft and < 22 ft, and shoulder width ≥ 4 ft	
		2: Pavement width ≥ 22 ft and shoulder width < 2 ft	
		2: Pavement width > 18 ft and < 22 ft and shoulder width ≥ 2 ft and < 4 ft	
		2: Pavement width ≤ 18 ft and shoulder width ≥ 4 ft	
		4: Pavement width > 18 ft and < 22 ft, and shoulder width < 2 ft	
		4: Pavement width ≤ 18 ft and shoulder width < 4 ft	
Roadside hazards	Average roadside hazard rating	0: Less than 1.5	4
		2: 1.5-3.0	
		4: More than 3.0	
Access density	Number of intersections and driveways per mile (driveway location per 911 address database)	0: Bottom fourth of the access density Crash Modification Factor (CMF) *	3
		1: Second lowest fourth of the access density CMF *	
		2: Second highest fourth of the access density CMF *	
		3: Top fourth of the access density CMF *	
Curve density	Number of curves per mile with a radius less than 1,000 ft and length greater than 100 ft	0: Segments with no curves	2
		1: Curve density percentile is 1%-50% of segments with curves	
		2: Curve density percentile is more than 50% of segments with curves	
Pavement condition	Average International Roughness Index (IRI)	0: Less than 95	2
		1: 95 to 170	
		2: More than 170	
Crash experience	Presence of a lane departure crash	0: No lane departure crashes	2
		2: One or more lane departure crashes	
Total available points			23

* Access Density CMF Equation as presented in the Highway Safety Manual (Equation 13-7)



6.2.2. Risk Factor Rankings

Segment risk factor ranking calculations were performed on all county paved roadway segments (greater than 0.5 miles in length and with posted speed limits of 40 mph or greater). The result of the rankings is shown in **Figure 22**.

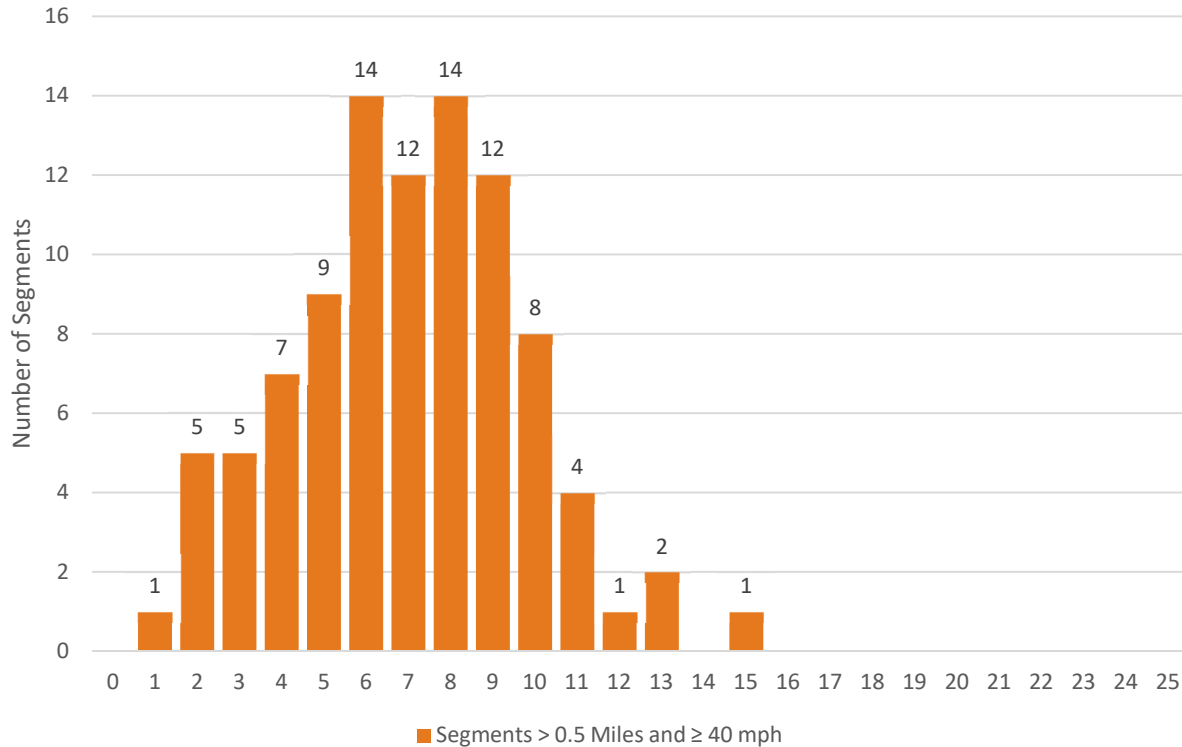
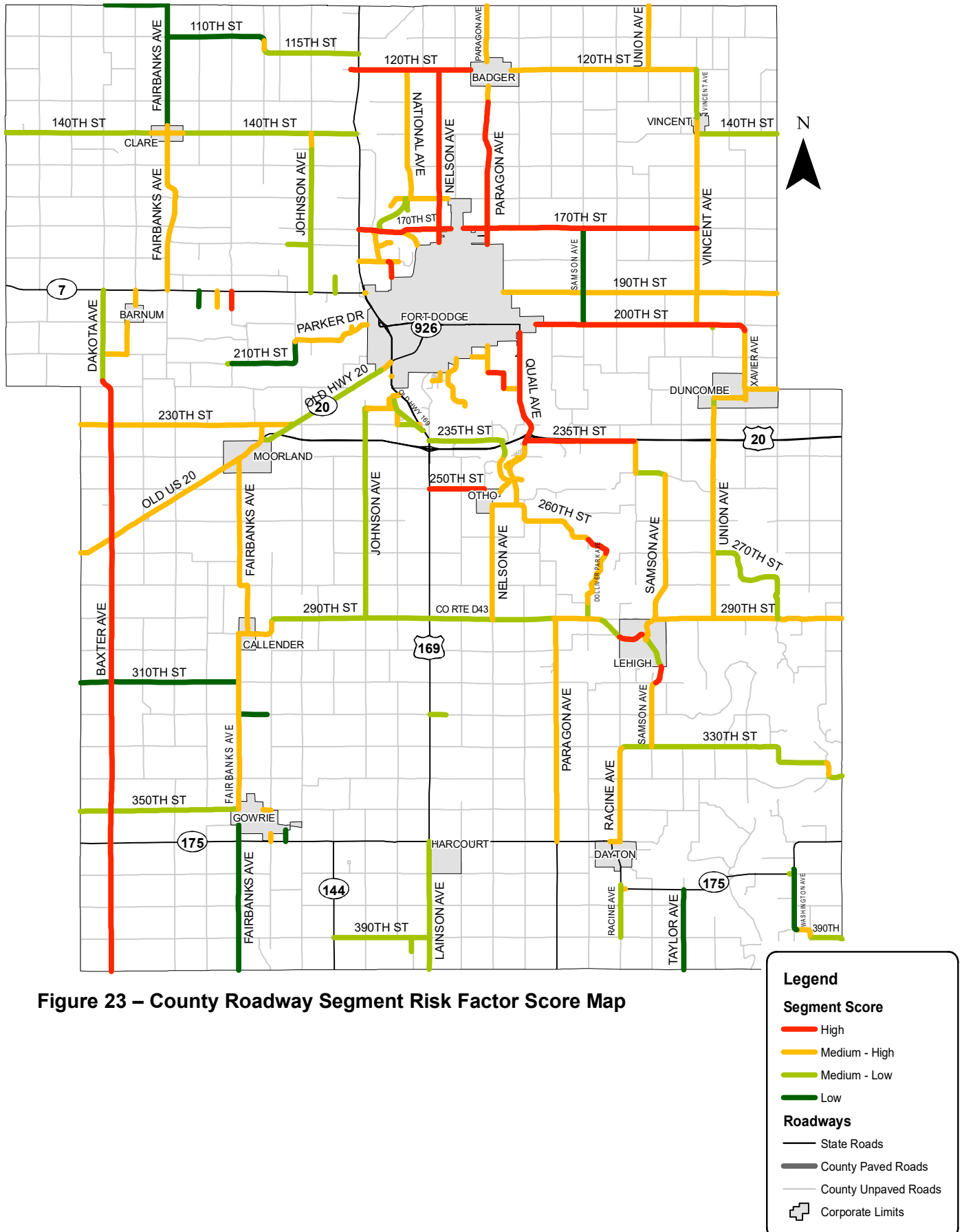


Figure 22 – County Paved Roadway Segment Risk Factor Ranking Summary

For visualization purposes, **Figure 23** shows the location and summary of risk factor ranking of each of the roadway segments analyzed within the LRSP.





6.2.3. Segment Countermeasures

Table 12 summarizes the segment countermeasures for consideration including CMFs and estimated costs. **Appendix B1** provides detailed descriptions for each segment safety countermeasure.

Table 12 – County Paved Roadway Segment Safety Countermeasure Summary

Safety Countermeasure	Crash Modification Factor (CMF)	Estimated Cost
Conduct Road Safety Assessment (RSA)	CMF varies based on recommendations	\$30,000/each
Conduct Access Control Analysis	CMF varies based on recommendations	\$30,000/each
Install 4" Retroreflective Edgeline and Centerline	FHWA Proven Countermeasure 0.76	\$800/mile (centerline) \$1,200/mile (edgeline)
Install 6" Retroreflective Edgeline (Both Sides of Road)	FHWA Proven Countermeasure 0.64 - 0.83	\$1,800/mile
Edgeline Rumble Strips	FHWA Proven Countermeasure 0.61 - 0.67	\$2,500/mile
Centerline Rumble Strips	FHWA Proven Countermeasure 0.55 - 0.91	\$1,000/mile
Pave Shoulder with Safety Edge	0.82 - 0.9 "Pave Shoulder" FHWA Proven Countermeasure 0.85 - 0.92 "Safety Edge"	\$65,000/mile
Review Curve and Provide Signage to Meet Current MUTCD and Iowa DOT Standards	FHWA Proven Countermeasure 0.59 - 0.96	\$5,000/curve
Review and Upgrade Curve Chevrons, Warning Signs, and Speed Advisory Plaques to Meet the Current Manual on Uniform Traffic Control Devices (MUTCD) and Iowa DOT Standards	FHWA Proven Countermeasures 0.75 - 0.96 "Chevrons" 0.59 - 0.61 "Warning Signs"	\$2,500/curve
Review and Upgrade Curve Warning Signs and Speed Advisory Plaques to Meeting MUTCD and Iowa DOT Standards	0.59 - 0.61	\$800/curve
Clear and Grub (Both Sides of Road)	0.78	\$5,000-\$10,000/mile

Figure 24 illustrates the proposed roadway segment safety improvements as described in the previous sections. It is important to note that the County Engineer should follow all applicable guidelines and standards when implementing the roadway segment improvements including the Manual on Uniform Traffic Control Devices (MUTCD).

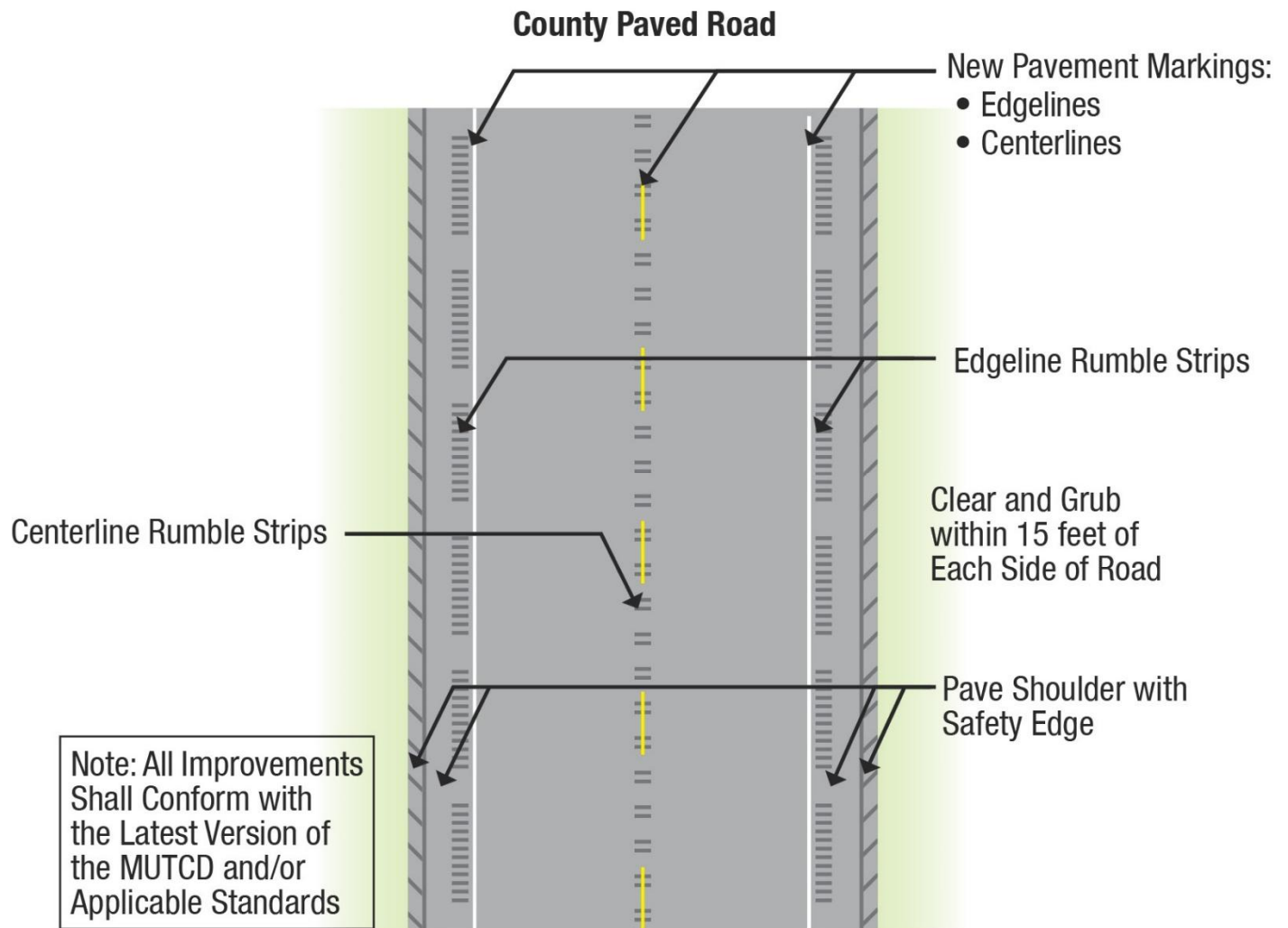


Figure 24 – County Paved Roadway Segment Safety Improvements

6.2.4. Project Selection Decision Tree

After conducting the risk factor calculations and rankings for all paved roadway segments within the county, and developing the segment safety countermeasures, a project selection decision tree was developed. The decision tree was utilized to develop and systemically define projects for the segments based on the characteristics of the segments (shoulder material type, lane width, etc.). The decision tree for roadway segment safety improvements is shown in **Figure 25**.

Each possible decision tree outcome represents a set of potential safety improvements for the roadway segment. The decision tree was utilized to determine projects for the segments with the highest risk factor rankings. Project sheets were developed for a minimum of the ten top-scoring segments in the county. Not all improvements are recommended at all locations and the project sheets contain the recommended improvements for the specific location based on the decision tree process, existing conditions, and defined criteria.

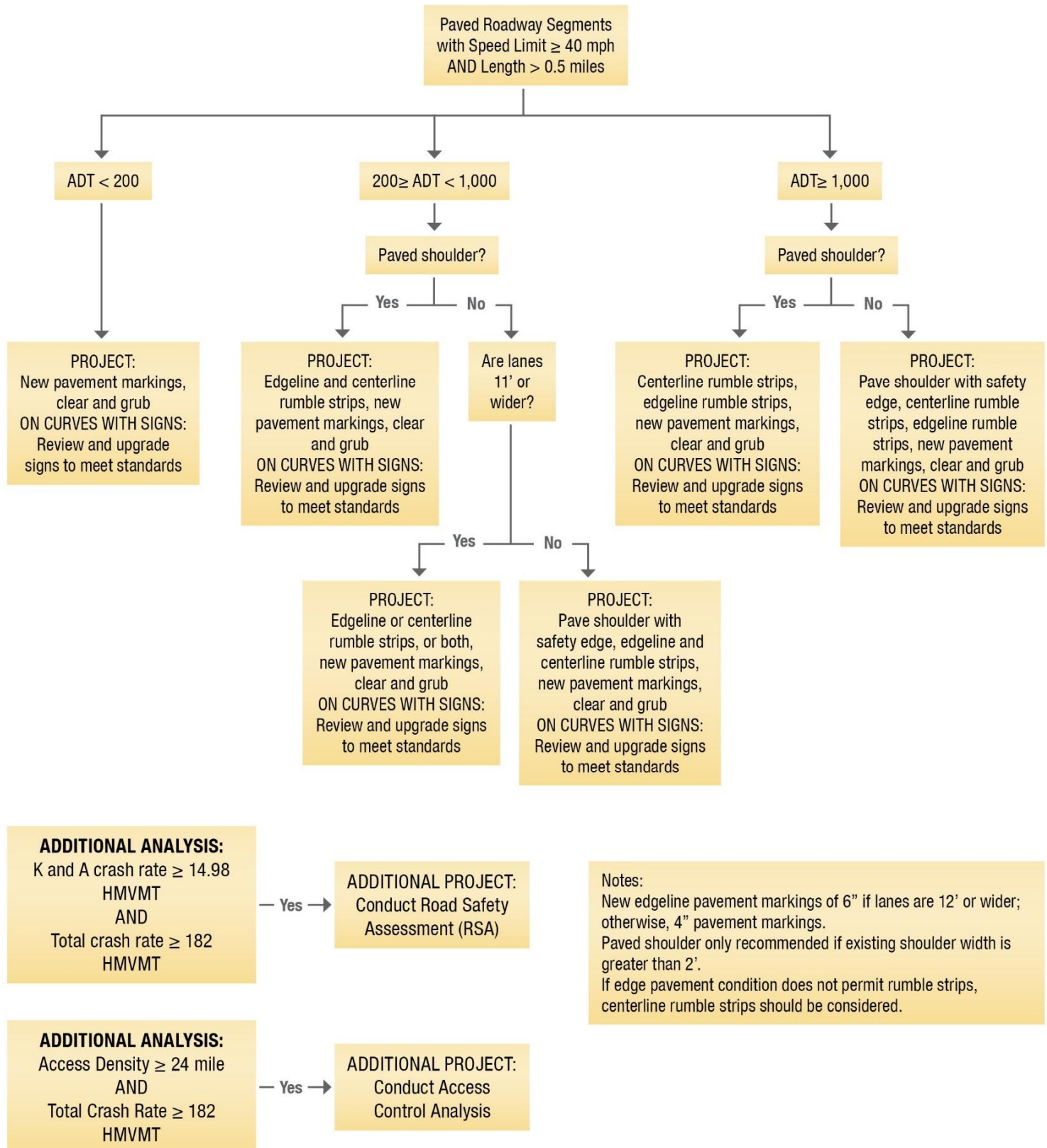


Figure 25 – County Paved Roadway Segment Project Decision Tree

6.2.5. Prioritized Segment Recommendations

After the decision tree was utilized to determine projects for the roadway segments with the greatest amount of risk factor points, project sheets were developed for these locations. The segments for which project sheets were developed (those with the greatest amount of risk factor points) are summarized in **Table 13** and the project sheets are included in **Appendix B2**. Also included in the table are the high scoring intersections and high scoring curves that fall within the segments.

Table 13 – County Paved Roadway Segment Prioritized Project Cost Summary

GPS ID	Segment	Segment Length (miles)	Risk Factor Points	High Scoring Intersections	High Scoring Curves	Estimated Project Cost
2865	DOLLIVER PARK AVE between QUAIL AVE and 200 ft NE of DOLLIVER MEMORIAL	0.79	15			\$ 27,000
2790	120TH ST between 1280 ft W of US 169 and 2610 ft E of OATES AVE	3.74	13			\$ 397,000
2797	170TH ST between US 169 and 2000 ft E of NELSON AVE	2.90	13	564105 564208		\$ 101,000
2899	NELSON AVE between 590 ft N of 31ST AVE N and 120TH ST	5.34	12			\$ 549,000
2866	MILL RD between PARAGON AVE and 220TH ST	0.95	11		94303	\$ 148,000
2895	MADISON AVE between 1010 ft N of 6TH AVE NW and 180TH ST	0.54	11			\$ 13,000
2914	QUAIL AVE between DIVISION and MIDWAY BLVD	3.59	11			\$ 67,000
2921	SAMSON AVE between LEHIGH CORPORATE LIMITS and 340 ft SW of 310TH ST	0.56	11			\$ 58,000
2798	D14 between 3960 ft W of PARAGON AVE and VINCENT AVE	7.30	10			\$ 702,000
2802	200TH ST between 2620 ft W of RACINE AVE and XAVIER AVE	6.60	10		18506	\$ 682,000
2811	P6D between SWALLOW AVE and QUAIL AVE	3.38	10			\$ 74,000
2812	D33 between LAINSON AVE and MINING BLVD	1.72	10			\$ 23,000
2826	P29 between 5260 ft S of 390TH ST and 980 ft N of DAKOTA AVE/220TH ST	18.52	10	562967		\$ 245,000
2864	HAYES AVE between 190TH ST and 2850 ft S of 190TH ST	0.54	10			*
2887	HWY 50 between RACINE AVE and 520 ft SE of SCHOOL ST	0.77	10			\$ 12,000
2909	PARAGON AVE between 2660 ft N of 25TH AVE N and 130TH ST	4.45	10			\$ 465,000
Total (15 Segments)						\$3,563,000

* The County Engineer requested that the project sheet be removed.



Figure 26 shows the locations of the roadway segments with highest risk ranking, where project sheets and specific segment recommendations were made.

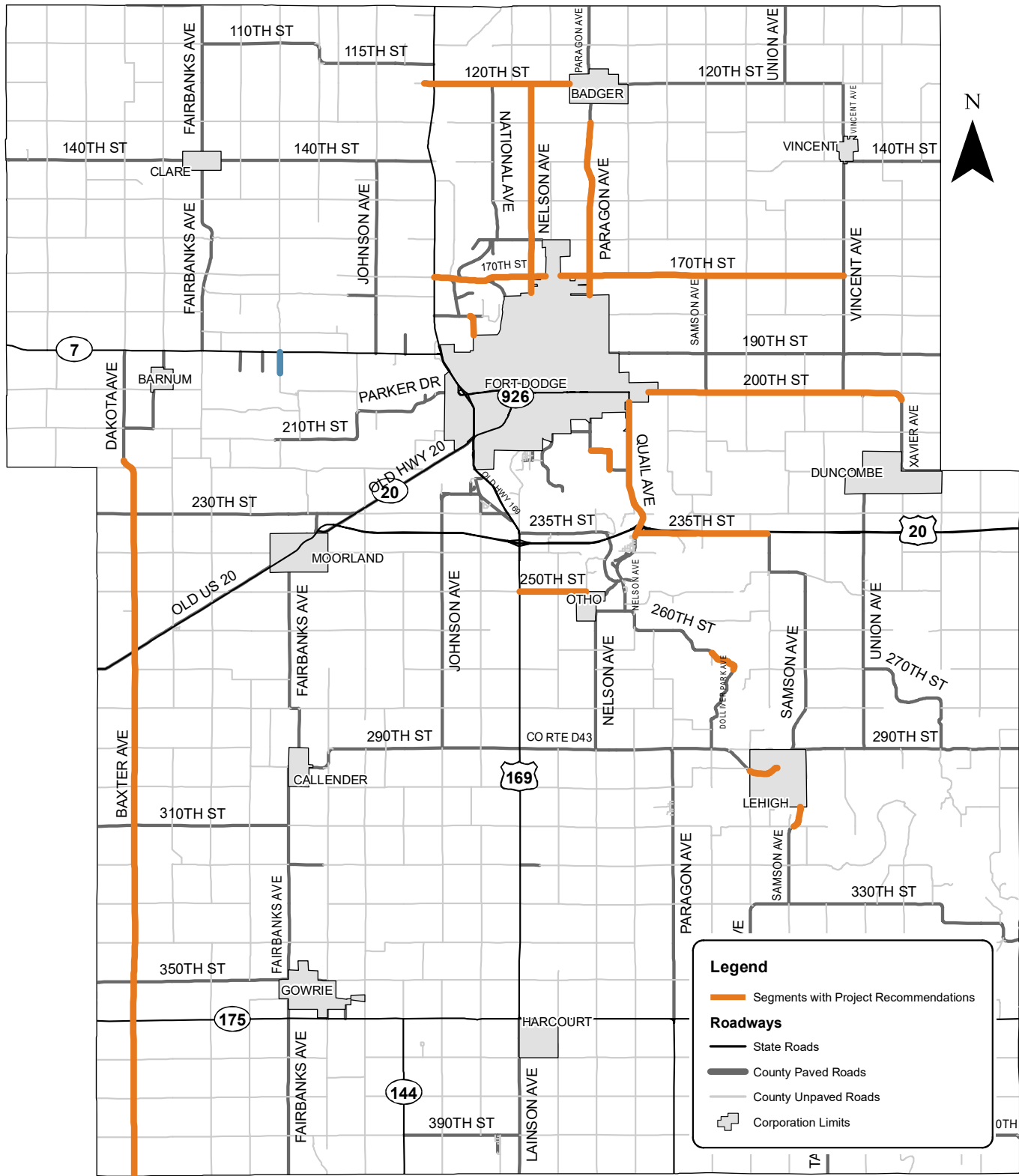


Figure 26 – County Paved Roadway Segment Prioritized Project Locations

Project sheets for the roadway segments with project recommendations are included in **Appendix B2**. The segment risk factor ranking results and relevant data for every analyzed roadway segment is included in **Appendix B3**.

6.2.6. Other Segment Countermeasures

As previously stated, the purpose of the LRSP project is to identify low-cost systemic safety improvement projects using a GIS analysis and a project selection decision tree. Safety improvements not included on the first page of the roadway segment project sheet may still merit consideration at a specific location. There are a variety of other safety improvements that could be considered that were not included in the project decision tree due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed at roadway segments throughout the county. **Table 14** provides a summary of several other roadway segment safety improvements that could be considered appropriate by the county and that were included on the back side of the project sheets as additional potential improvements. The CMFs, where they have been defined, and estimated costs of these countermeasures are included in the table. Detailed descriptions of each of the countermeasures is provided in **Appendix B1**. Estimated costs for these countermeasures were noted on the back side of the project sheet at the workshop, as directed by the County Engineer. However, the County Engineer could choose to add or remove such countermeasures from consideration at any time, based on engineering judgment or new information.

Table 14 – Additional Potential Roadway Segment Safety Countermeasure Summary

Safety Countermeasure	Crash Modification Factor (CMF)	Estimated Cost
Flattening and Widening Foreslopes	FHWA Proven Countermeasure 0.58 - 0.71	\$75,000/mile
On-Pavement Markings for Speed Control	CMF not defined	\$500/each
Delineate Roadside Hazards with Retroreflective Markers	CMF not defined	\$15/each
Guardrail	0.53 - 0.56 New Guardrail Along Embankment	\$50,000/mile
Post-Mounted Delineators	0.55 Install Edgelines, Centerlines, and Post Mounted Delineators	\$4,000/mile
Review Curve and Provide Signage to Meet Current MUTCD and Iowa DOT Standards	FHWA Proven Countermeasure 0.59 - 0.96	\$5,000/curve
Retroreflective Strips on Chevron Sign Posts	CMF not defined	\$100/curve
Transverse Rumble Strips Prior to Curve	0.66 Install Transverse Rumble Strips as Traffic Calming Device	\$2,000/curve
Remove/Relocate Objects in Hazardous Locations	FHWA Proven Countermeasure 0.62	\$1,000/each
Superelevation Correction on Curves	CMF not defined	\$100,000/each
Install High Friction Surface Treatment (HFST)	FHWA Proven Countermeasure 0.48 - 0.76	\$150,000/mile
Speed Activated Flashers on Chevron Signs	CMF 0.59 - 0.61 Install Flashers, Chevron Signs, and Curve Warning Signs	\$2,000/each



6.3. Intersections

The methodology described in **Section 6.1** was followed for a systematic analysis of county paved intersections based on the determined risk factors. Additional details on the risk factor calculations, risk factor ranking results, project selection decision tree, and project sheets are described in the following sections.

6.3.1. Risk Factor Summary

Every intersection containing at least one county-maintained paved roadway leg was analyzed for risk according to the following eight key attributes:

- **Distance from Previous Stop Sign:** if any stop-controlled approach had a distance of at least 1.5 miles from the previous stop sign, risk points were assigned. The longer the distance a driver travels without stopping, the more likely they are to fail to stop at the next stop sign because they are not expecting it.
- **Intersection Skew:** the intersection was assigned risk factor points if any of the side roads had an approach angle (skew) of less than 85 degrees. Based on Iowa crash data analyzed by InTrans, crash experience increases at intersections with skew at 85 degrees and 70 degrees. According to the *Highway Design Handbook for Older Drivers and Pedestrians*, "Skew angles in excess of 75 degrees often create special problems at stop-controlled rural intersections. The angle complicates the vision triangle for the stopped vehicle; increases the time to cross the through road; and results in a larger, more potentially confusing intersection."
- **Horizontal Curvature:** the number of curves (with length more than 100 feet and radius less than 1,000 feet) within 250 feet of the intersection on any county- or state-maintained approach. Risk factor points were assigned to intersections with one or more curves within close proximity of the intersection. Roadway curves in close proximity to intersections can limit sight distance, increasing crash potential.
- **Traffic Volume (DEV):** the average number of vehicles entering the intersection per day. The DEVs for all the intersections in the county were compared against each other to assign higher risk factor points to intersections with higher DEVs within the county. It is understood that more vehicles entering an intersection creates more exposure and therefore, increases the risk of a crash.
- **Minor Street Volume:** with a higher minor street volume, there is an increase in crash exposure, specifically with angle crashes. The third highest approach volume was used for the minor street volume, and volumes, as compared to other minor street volumes throughout the county were used to assign higher risk factor points where minor street volumes were higher.
- **Access Management:** risk points were assigned if an access point (driveway or other intersection) was located within 250 feet of the intersection. Driveways and other access points located within the functional area of intersections create additional opportunities for conflict points and cause drivers to make more decisions within the functional area of an intersection, increasing risk for a crash.
- **Crash Experience:** each intersection was assigned risk factor points if a K or A crash occurred within 150 feet of the intersection. This attribute takes into account crash history, which may be indicative of improvement needs.
- **Intersection Configuration:** as an additional risk factor to capture potential conflicts at an intersection, the number of approaches were considered as a risk factor. If an intersection had four or more approaches, it was assigned a risk factor point.

Table 15 summarizes the risk factors utilized for the risk factor analysis as well as the points developed in coordination with the Iowa DOT. The maximum number of available points for intersection risk was 22.

Table 15 – County Paved Intersections – Risk Factor Ranking

Risk Factor	Measurement	Points	Max Points Available
Distance from previous stop sign	Stop sign locations based on information provided by the County Engineer	0: Less than 1.5 miles	4
		4: 1.5 miles or more	
Intersection skew	Skew angle of most skewed approach	0: 85-90 degrees	4
		2: 70-85 degrees	
		4: Less than 70 degrees	
Horizontal curvature	Intersection on or within 250 feet of a curve (Length > 100' and Radius < 1,000')	0: None	4
		4: 1 or more	
Traffic volume	Daily Entering Vehicles (DEV)	0: DEV percentile is 0%-25%	3
		1: DEV percentile is 25%-50%	
		2: DEV percentile is 50%-75%	
		3: DEV percentile is 75%-100%	
Minor street volume	Average Daily Traffic (ADT)	0: Bottom third of county minor street ADTs	2
		1: Middle third of county minor street ADTs	
		2: Top third of county minor street ADTs	
Access management	Driveways or another intersection within 250 feet of the intersection	0: None	2
		1: 1 or 2	
		2: More than 2	
Crash experience	Fatal or serious injury (K or A) crash within 150 feet of the intersection	0: None	2
		2: 1 or more	
Intersection configuration	Number of approaches	0: Less than 4 approaches	1
		1: 4 or more approaches	
Total available points			22



6.3.2. Risk Factor Rankings

Risk factor calculations were performed for each of the intersections in the county containing at least one county-maintained paved approach. The results of the risk factor rankings are provided in **Figure 27**. To further aid the county in determining which projects they may want to pursue, the intersections were divided into two categories:

- **County-State:** This includes intersections of county roads with Iowa DOT-maintained roads.
- **County-County and County-Other:** This includes intersections of county roads with other county roads as well as intersections of county roads with other roads that are not maintained by the county or the Iowa DOT (such as city streets).

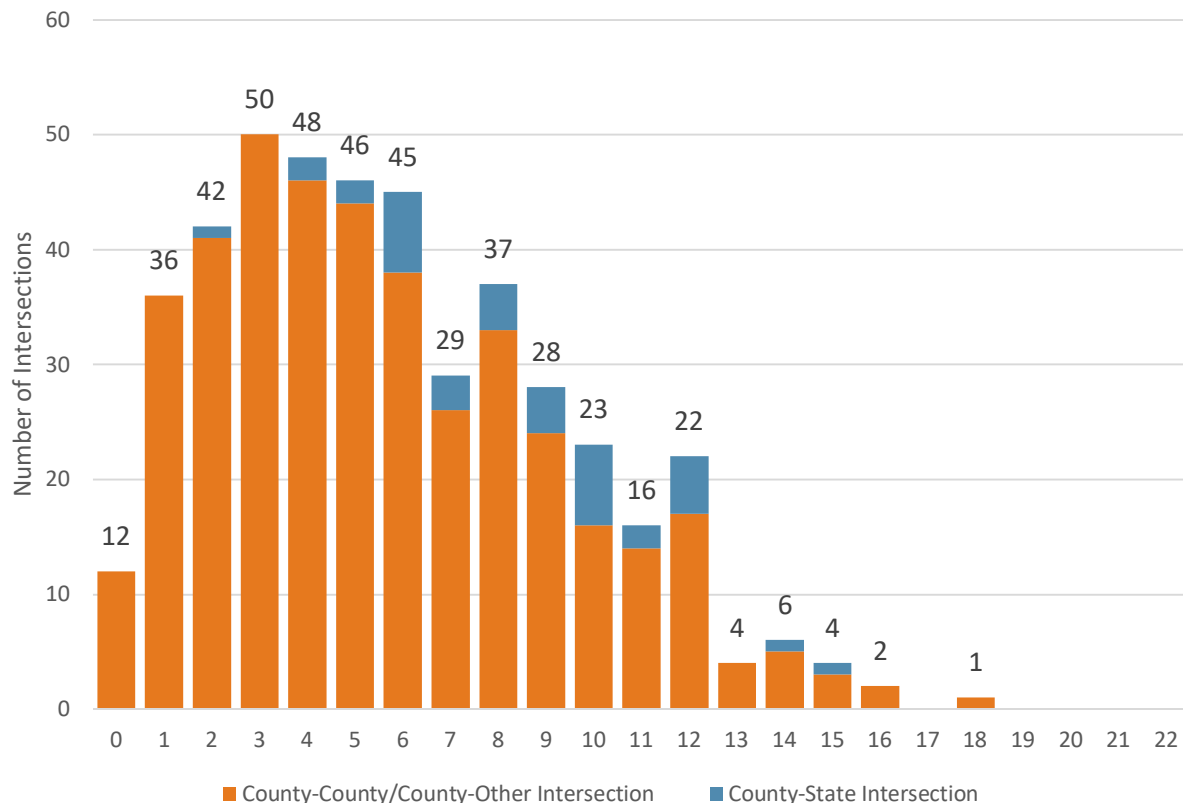
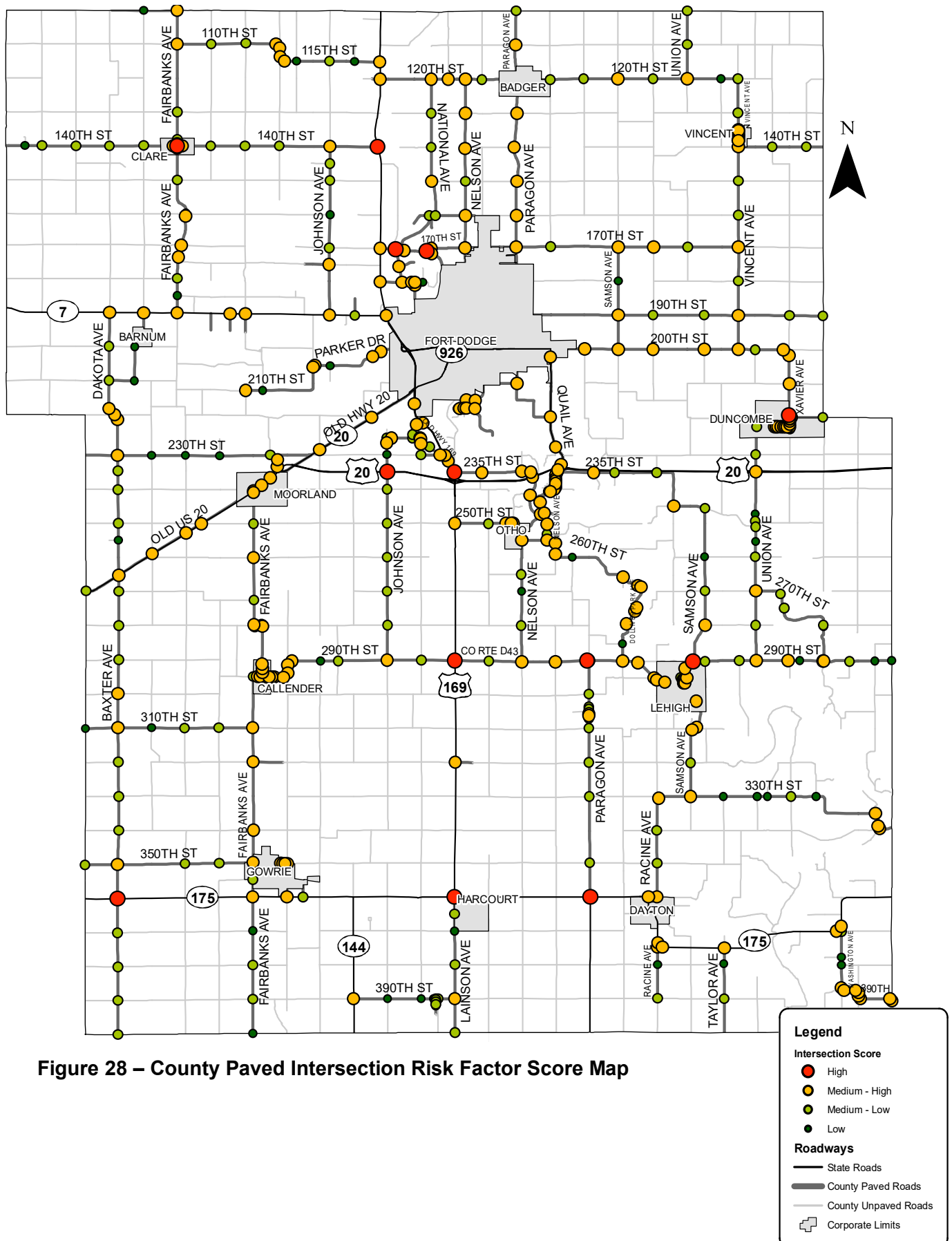


Figure 27 – County Paved Intersection Risk Factor Ranking Summary

For visualization purposes, **Figure 28** on the following page shows the location and risk factor score of each intersection analyzed within the LRSP.





6.3.3. Intersection Countermeasures

Table 16 summarizes the intersection countermeasures for consideration including CMFs and estimated costs at the county paved intersections. **Appendix C1** provides detailed descriptions for each intersection safety countermeasure.

Table 16 – County Paved Intersection Safety Countermeasure Summary

Safety Countermeasure	Crash Modification Factor (CMF)	Estimated Cost
Coordinate with Local Jurisdiction on Signal Modifications	Varies based on modifications	\$2,500/each
Signal warrant analysis to consider removal of signal	0.76 Remove Unwarranted Signal	\$5,000/each
Intersection Configuration Evaluation (ICE)	Varies based on recommendations	\$25,000/each
Implement Results of ICE	FHWA Proven Countermeasure 0.18 - 0.42 Convert Stop-Control to Roundabout 0.23 - 0.56 Install Traffic Signal FHWA Proven Countermeasure 0.23 - 0.36 Restrict Left Turn Movements	\$750,000/each
All-Way Stop Warrant Analysis and Converting Two-Way Stop to All-Way Stop	0.39	\$5,000/each
All-Way Stop Warrant Analysis and Removal of Stop Signs on Major Approach	CMF not defined	\$5,000/each
Destination Lighting	0.62	\$5,500/each
Upgrade Signs and Pavement Markings (Paved Approach)	FHWA Proven Countermeasures 0.4 - 0.69 "Stop Ahead" 0.75 - 0.91 "New Stop Sign"	\$2,200/leg
Upgrade Stop Sign and Stop Bar (Unpaved Approach)	FHWA Proven Countermeasure 0.75 - 0.91 "New Stop Sign"	\$1,000/leg
Install Second Stop Sign and Stop Ahead Signs	CMF not defined	\$1,200/leg
Beacon on All Stop Signs	0.42 - 0.87	\$2,500/sign
Transverse Rumble Strips on All or Minor Approaches	0.79 - 0.87	\$1,000/leg
Install Intersection Warning Signs and Advance Street Name Plaque on Major Approaches	CMF not defined	\$1,200/leg
Clear and Grub	0.78	\$1,500/leg

Figure 29 illustrates the proposed intersection improvements as described in the previous sections. It is important to note that the County Engineer should follow all applicable guidelines and standards when implementing the intersection improvements.

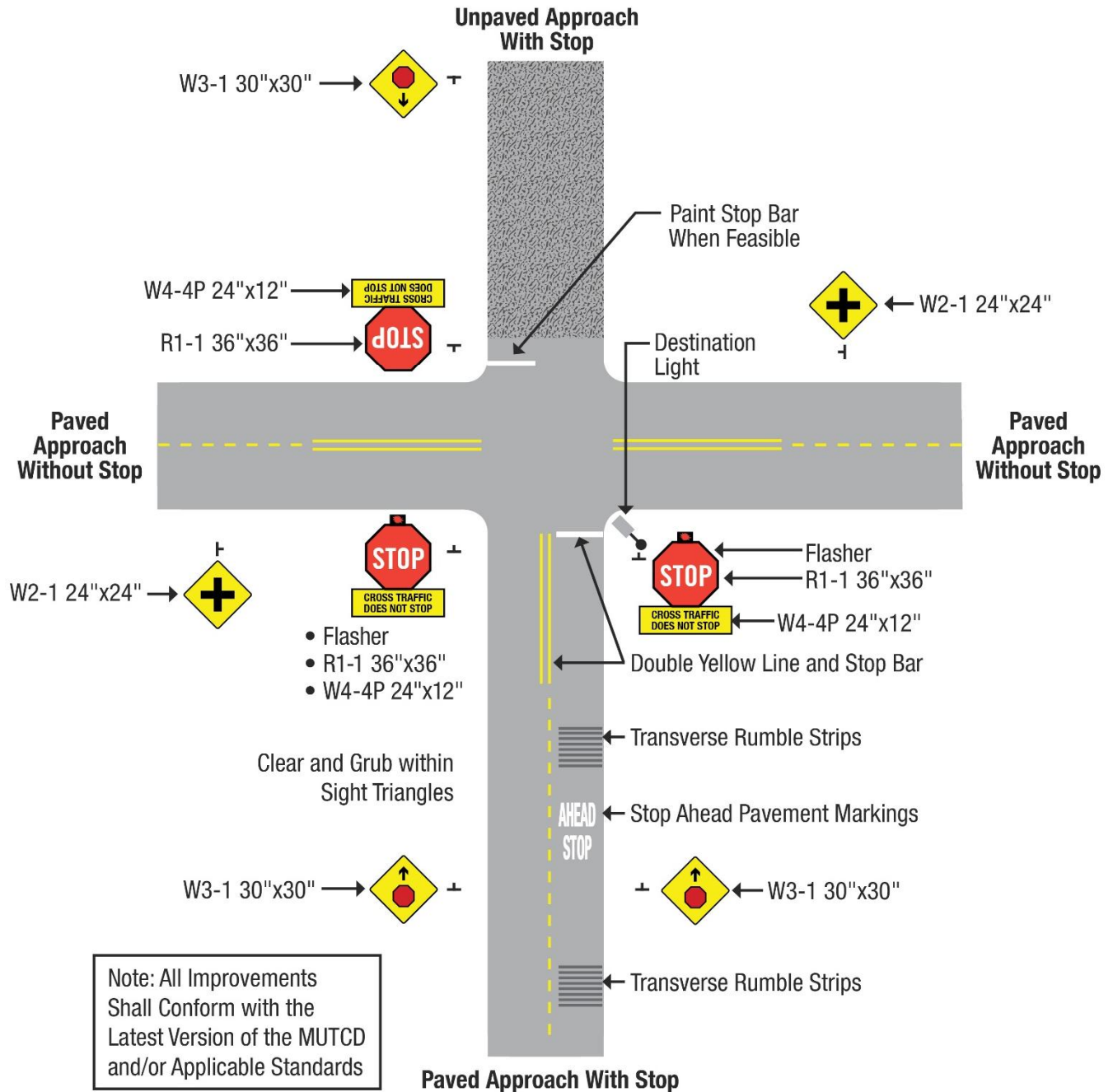


Figure 29 – County Paved Intersection Safety Improvements

6.3.4. Project Selection Decision Tree

After conducting the risk factor calculations and rankings for all intersections within the county, and developing the county paved intersection countermeasures, a project selection decision tree was developed. The decision tree was utilized to develop and systemically define location-specific safety recommendations for the intersections based on the characteristics of the intersections (DEV, paved approaches, crash history, major approach ADT, minor approach ADT, etc.). The decision tree for intersection safety improvements is shown in **Figure 30**.

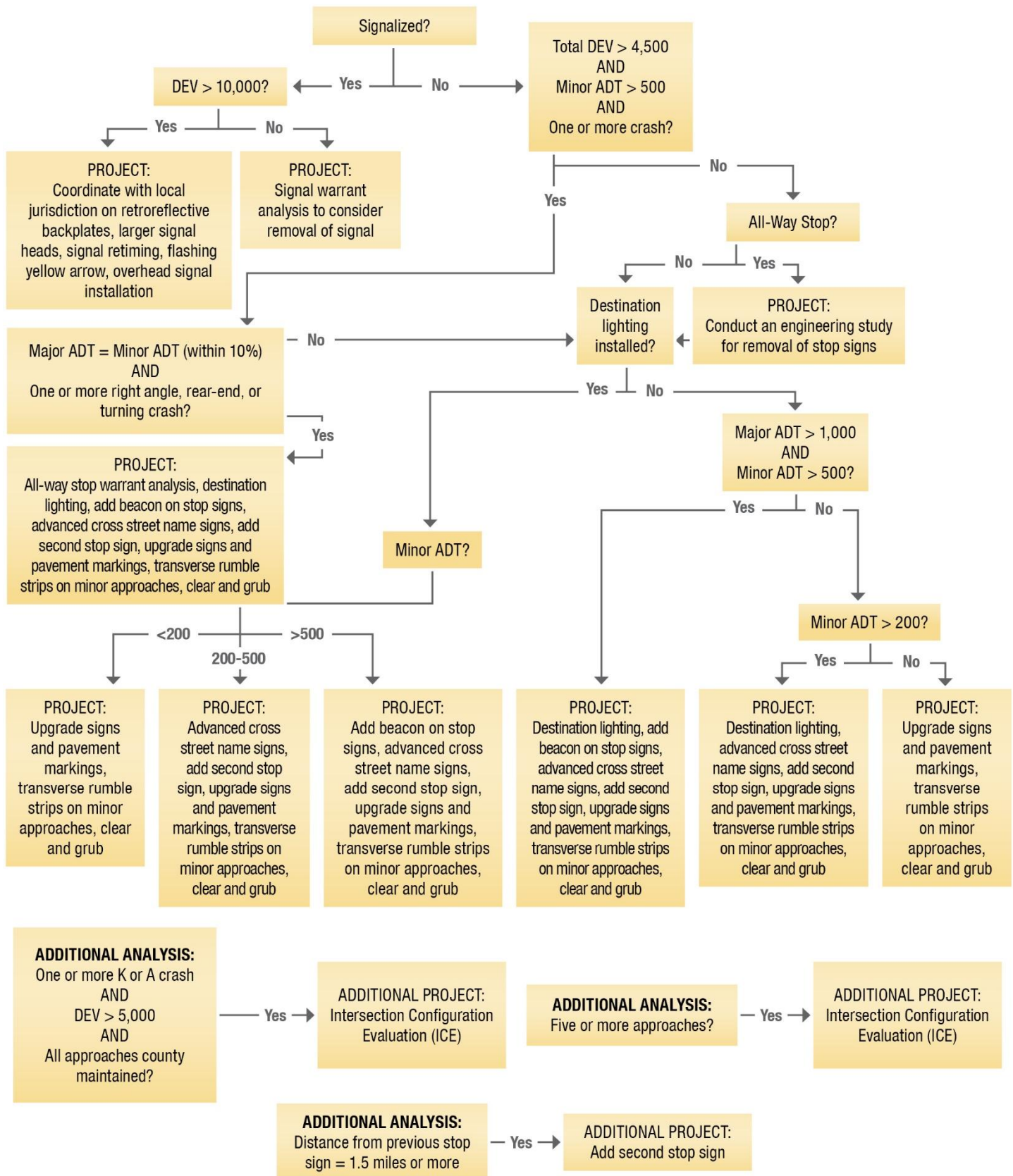


Figure 30 – County Paved Intersection Project Decision Tree



Each possible decision tree outcome represents a set of potential safety improvements for the intersection. The decision tree was utilized to determine projects for the intersections with the highest risk factor rankings. Project sheets were developed for a minimum of the five top-scoring intersections in the County-County and County-Other and County-State categories. Not all improvements are recommended at all locations and the project sheets contain the recommended improvements for the specific location based on the decision tree process, existing conditions, and defined criteria.

6.3.5. Prioritized Intersection Recommendations

After the decision tree was utilized to identify safety improvement projects for the intersections with the greatest amount of risk factor points, project sheets were developed for these locations. The intersections for which project sheets were developed (those with the greatest amount of risk factor points) are summarized in **Table 17** and the project sheets are located in **Appendix C2**. For those intersections located on a high scoring roadway segment, the GPS ID of the segment is listed in the table.

Table 17 – County Paved Intersection Prioritized Project Cost Summary

GPS ID	Intersection	Risk Factor Points	High Scoring Segments	Estimated Project Cost
County-County / County-Other Intersections				
563547	Co Rd D43/CO RTE D43/290TH ST & Co Rd P61/PARAGON AVE	18		\$ 20,000
563478	Co Rd D46/290TH ST & Co Rd P6D/SAMSON AVE & E HILL ST & DIAMOND AVE	16		\$ 19,000
564811	FRONT ST & HOOD ST	16		\$ 67,000
564089	Co Rd D20/XAVIER AVE & SIMPSON ST	15		\$ 31,000
564105	Co Rd D14/170TH ST & NATIONAL AVE	15	2797	\$ 115,000
564208	Co Rd D14/170TH ST & MADISON AVE	15	2797	\$ 26,000
County-County / County-Other Total (6 Intersections)				\$ 278,000
County-State Intersections				
704672	US 169/360TH ST/LAINSON AVE & IA 175 & Co Rd P46	15		\$ 71,000
704678	US 169/PARAGON AVE/360TH ST & IA 175 & Co Rd P61	14		\$ 71,000
562311	US 20/235TH ST & Co Rd P51/JOHNSON AVE	12		\$ 32,000
562589	US 169/LAINSON AVE & Co Rd D43/CO RTE D43/290TH ST	12		\$ 48,000
562667	US 169 & 235TH ST	12		\$ 9,000
562967	IA 175/360TH ST & Co Rd P29/BAXTER AVE	12	2826	\$ 55,000
705807	US 169 & Co Rd C66/140TH ST	12		\$ 25,000
562457	US 20/235TH ST & Co Rd P73/UNION AVE*	10		\$ 48,000
County-State Total (8 Intersections)				\$ 359,000
Intersection Total (14 Intersections)				\$ 637,000

* Project sheet developed at the request of the County Engineer.



Figure 31 illustrates the locations of the intersections with highest risk ranking, where project sheets and specific intersection improvement recommendations were made.

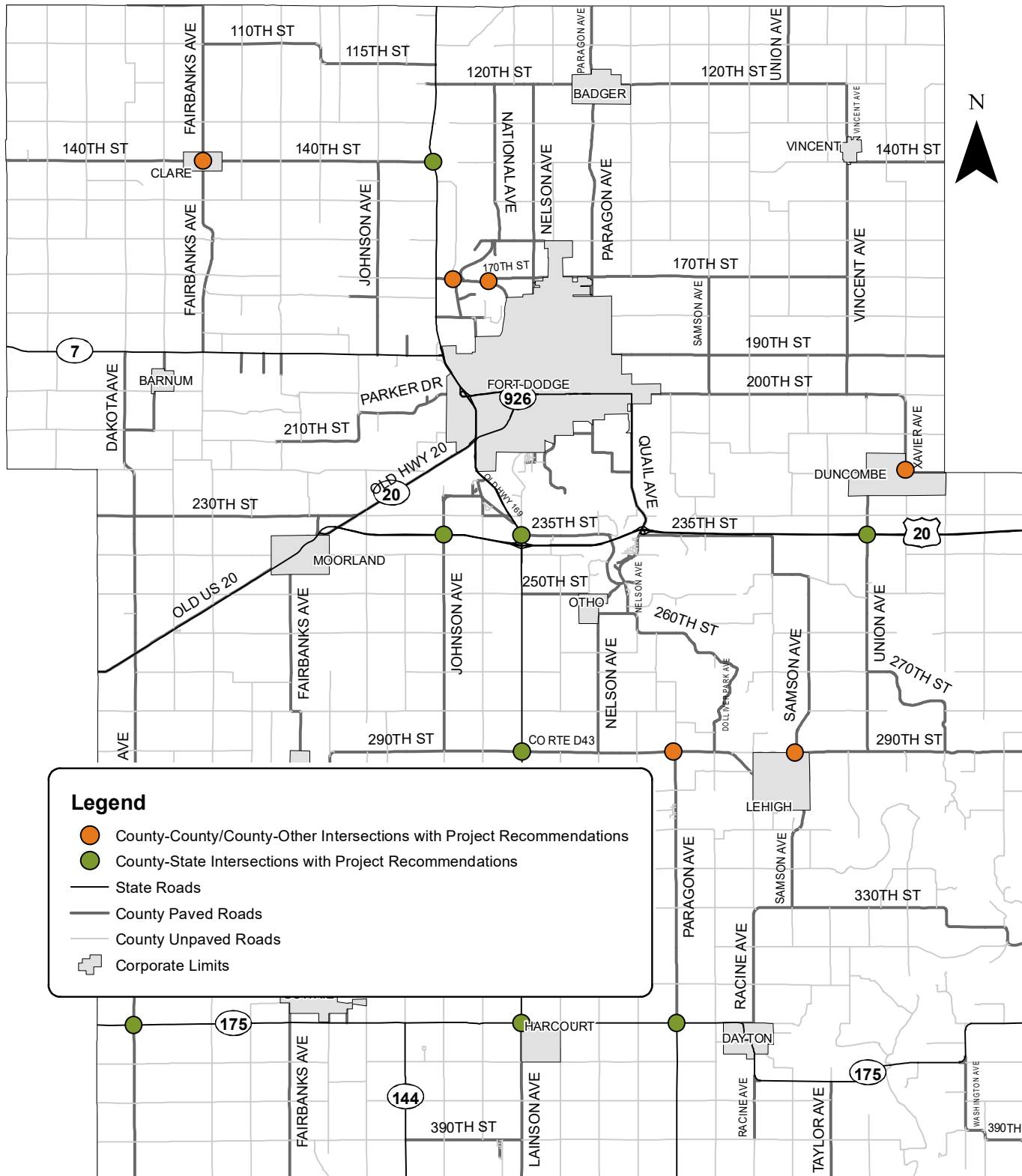


Figure 31 – County Paved Intersection Prioritized Project Location

Project sheets for the intersections with project recommendations are included in **Appendix C2**. The intersection risk factor ranking results and relevant data for every analyzed intersection is included in the summary spreadsheet included in **Appendix C3**.

6.3.6. Other Intersection Countermeasures

The purpose of the LRSP project is to identify low-cost systemic safety improvement projects using a GIS analysis and a project selection decision tree. A safety improvement that is not included on the project sheet may still merit consideration at a particular location. There are a variety of safety improvements that could be considered that were not included in the project decision tree due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed at intersections throughout the county. **Table 18** provides a summary of several other intersection safety improvements that could be considered appropriate by the county and that were included on the back side of the project sheets as additional potential improvements. The CMFs, where they have been defined, and estimated costs of these countermeasures are included in the table. Detailed descriptions of each of the countermeasures is provided in **Appendix C1**. Estimated costs for these countermeasures were noted on the back side of the project sheet at the workshop, as directed by the County Engineer. However, the County Engineer could choose to add or remove such countermeasures from consideration at any time, based on engineering judgment or new information.

Table 18 – County Paved Intersection Additional Project Improvement Summary

Safety Countermeasure	Crash Modification Factor (CMF)	Estimated Cost
Provide Left-Turn Lanes at Intersection	FHWA Proven Countermeasure 0.52	\$75,000/leg
Provide Right-Turn Lanes at Intersection	FHWA Proven Countermeasure 0.74	\$75,000/leg
Realign Intersection Approaches to Reduce or Eliminate Skew	CMF varies based on original skew angle	\$200,000/leg
Provide Bypass Lane on Shoulder at T-Intersection	CMF not defined	\$50,000/each
Convert Offset T-Intersection to Four-Legged Intersection	CMF not defined	\$300,000/each
Use Indirect Left-Turn Treatments to Minimize Conflicts	FHWA Proven Countermeasure 0.8	\$75,000/leg
Convert Four-Legged Intersection to Offset T-Intersection	CMF not defined for rural areas	\$300,000/each
Install Solar-Powered Flashing Beacon on Intersection Warning Sign	CMF not defined	\$2,500/leg
Install Stop Signs with LED Flashing Lights	CMF not defined	\$2,500/leg
Install Retroreflective Strips on Stop Sign Posts	CMF not defined	\$100/each
Low-Cost Intersection Conflict Warning System (ICWS)	0.45 - 0.7	\$15,000/each



6.4. Horizontal Curves

The methodology described in **Section 6.1** was followed for county-wide analysis of paved horizontal curves based on the determined risk factors. Additional details on the risk factor calculations, risk factor ranking results, project selection decision tree, and project sheets are described in the following sections.

6.4.1. Risk Factor Summary

Each paved horizontal curve that was identified in the horizontal curve database (January 2016 update) within the county was systematically analyzed for risk according to the following six key attributes:

- **Traffic Volume (ADT):** the average number of vehicles per day along the roadway curve. The ADTs for all the curves within the county were compared against each other to assign higher risk to curves with a higher ADT within the county. It is understood that more vehicles traveling along a curve increases the risk of a crash.
- **Curve Radius:** all curves with radii smaller than 2,500 feet and with a length greater than 100 feet were assessed risk factor points. Curves with smaller radii were assigned additional points based on the crash data reviewed for county paved horizontal curves, showing more crashes on curves with smaller radii.
- **Shoulder Width:** risk factor points were assigned to all curves with shoulder widths less than six feet, with more risk factor points associated with narrower shoulders. This was based on the HSM Chapter 10, Table 10-9 and 10-10, which illustrates that with wider shoulders, crash risk is reduced.
- **Access Management:** risk was assessed if a driveway was within 250 feet of the curve. Additional risk points were assessed if an intersection was within 250 feet of the curve. Driveways and other access points located on or near curves create additional opportunities for conflict points and cause drivers to make additional decisions within the curve, with a potential for reduced sight distance, increasing risk of a crash.
- **Pavement Condition:** the average of the recorded roughness indices for the length of the segment. Pavement with an IRI value over 95 could potentially cause safety concerns and were assigned risk factor points.
- **Crash Experience:** each curve was assigned risk factor points if a K or A crash occurred within 150 feet of the curve. This attribute takes into account crash history, which may be indicative of improvement needs.

Table 19 summarizes the risk factors used for the risk factor analysis as well as the points developed in coordination with the Iowa DOT. As can be seen, the maximum number of available for curve risk factor points was 21.

Table 19 – County Paved Horizontal Curves – Risk Factor Ranking

Risk Factor	Measurement	Points	Max Points Available
Traffic Volume	Average Daily Traffic (ADT)	0: ADT percentile is 0%-14.3%	6
		1: ADT percentile is 14.3%-28.6%	
		2: ADT percentile is 28.6%-42.9%	
		3: ADT percentile is 42.9%-57.1%	
		4: ADT percentile is 57.1%-71.4%	
		5: ADT percentile is 71.4%-85.7%	
		6: ADT percentile is 85.7%-100%	
Curve radius	Radius of curve in feet	0: Greater than 2,500 feet	4
		1: 1,000 to 2,500 feet	
		3: 500 to 1,000 feet	
		4: Less than or equal to 500 feet	
Shoulder width	Shoulder width in feet	0: 6-foot shoulder and greater	4
		2: 2-foot shoulder to 6-foot shoulder	
		4: less than 2-foot shoulder	
Access management	Intersections and driveways within 250 feet of the curve	0: no intersection within 250 feet	3
		3: intersection within 250 feet	
Pavement condition	Average International Roughness Index (IRI)	0: Less than 95	2
		1: 95 to 170	
		2: More than 170	
Crash experience	Fatal or serious injury (K or A) crash within 150 feet of the curve	0: none	2
		2: 1 or more	
Total available points			21



6.4.2. Risk Factor Rankings

The risk factor calculations were performed on each of the curves on paved roads in the county which have a length greater than or equal to 100 feet and a radius less than 2,500 feet. The results of the risk factor rankings are provided in **Figure 32**.

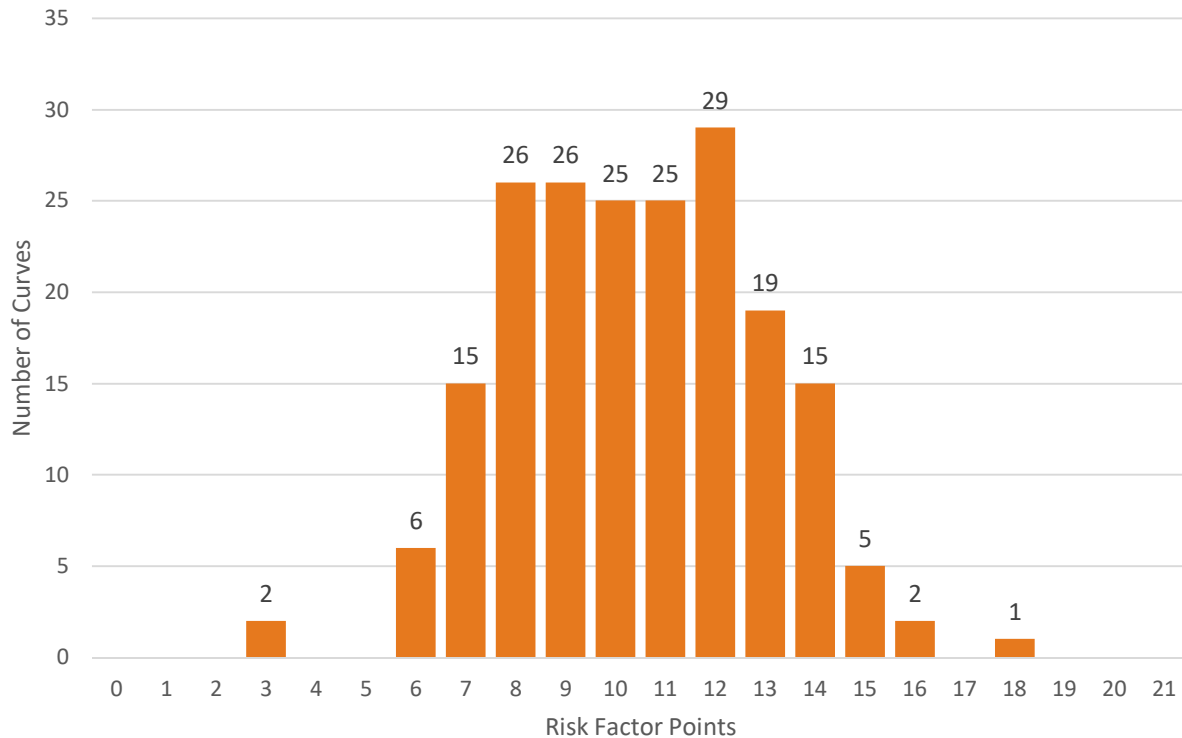


Figure 32 – County Paved Horizontal Curve Risk Factor Ranking Summary

For visualization purposes, **Figure 33** on the following page shows the location and risk factor ranking of each curve analyzed within the LRSP.

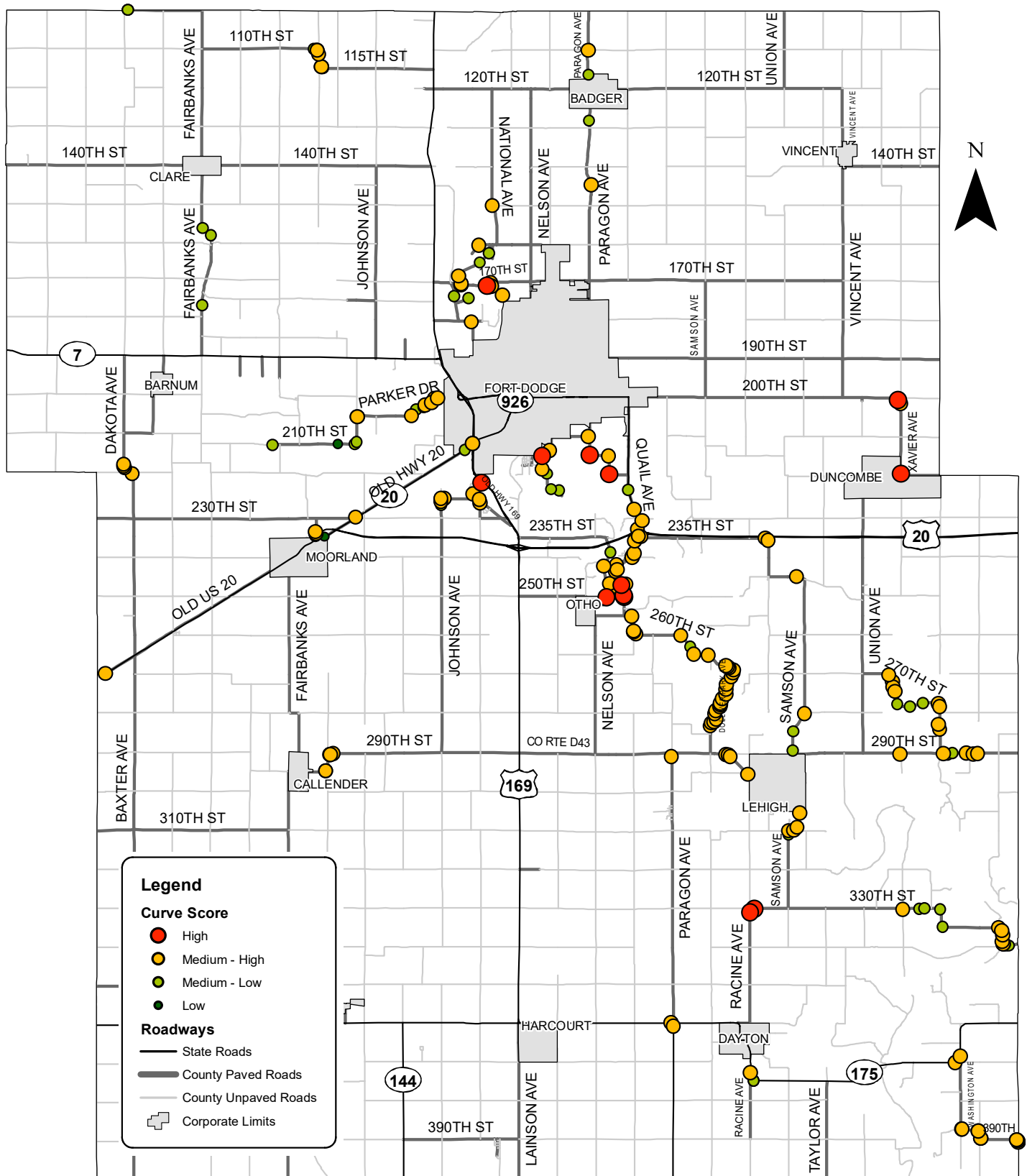


Figure 33 – Horizontal Curve Risk Factor Score Map



6.4.3. Curve Countermeasures

Table 20 summarizes the curve countermeasures for consideration including CMFs and estimated costs. **Appendix D1** provides detailed descriptions for each curve safety countermeasure.

Table 20 – County Paved Horizontal Curve Safety Countermeasure Summary

Safety Countermeasure	Crash Modification Factor (CMF)	Estimated Cost
Install 4" Retroreflective Edgeline and Centerline	FHWA Proven Countermeasure 0.76	\$800/mile (centerline) \$1,200/mile (edgeline)
Install 6" Retroreflective Edgeline (Both Sides of Road)	FHWA Proven Countermeasure 0.64 - 0.83	\$1,800/mile
Pave Shoulder with Safety Edge	0.82 - 0.9 "Pave Shoulder" FHWA Proven Countermeasure 0.85 - 0.92 "Safety Edge"	\$65,000/mile
Edgeline Rumble Strips	FHWA Proven Countermeasure 0.61 - 0.67	\$2,500/mile
Centerline Rumble Strips	FHWA Proven Countermeasure 0.55 - 0.91	\$1,000/mile
Review and Provide Curve Chevrons, Curve Warning Signs, and Speed Advisory Plaques to Meet the Current Manual on Uniform Traffic Control Devices (MUTCD) and Iowa DOT Standards	FHWA Proven Countermeasures 0.59 - 0.96	\$5,000/curve
Review and Upgrade Curve Chevrons, Curve Warning Signs, and Speed Advisory Plaques to Meet Current MUTCD and Iowa DOT Standards, if needed	FHWA Proven Countermeasures 0.59 - 0.96	\$2,500/curve
Clear and Grub	0.78	\$10,000/mile

Figure 34 illustrates the proposed horizontal curve safety improvements as described in the previous sections. It is important to note that the County Engineer should follow all applicable guidelines and standards when implementing the curve improvements.

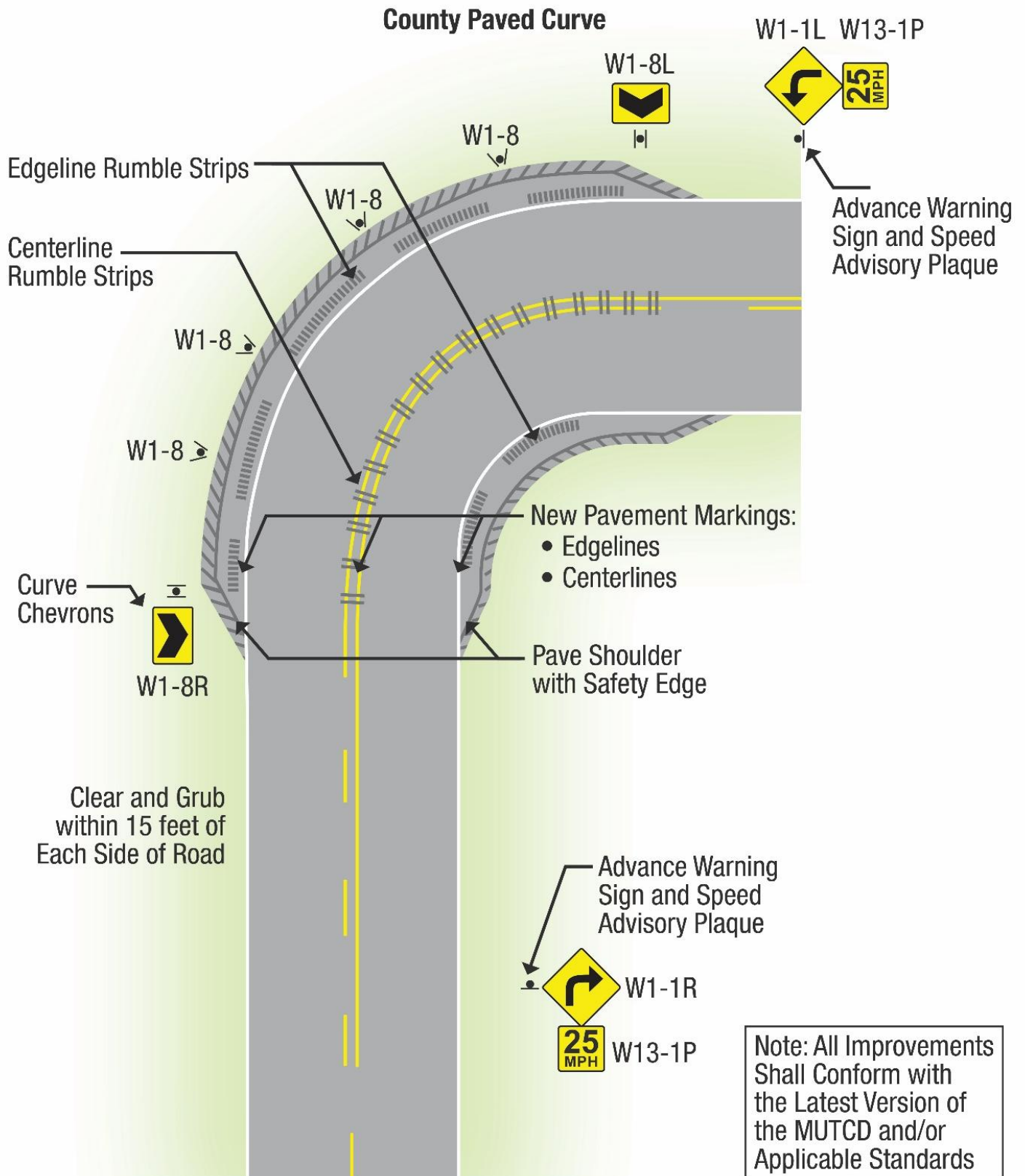


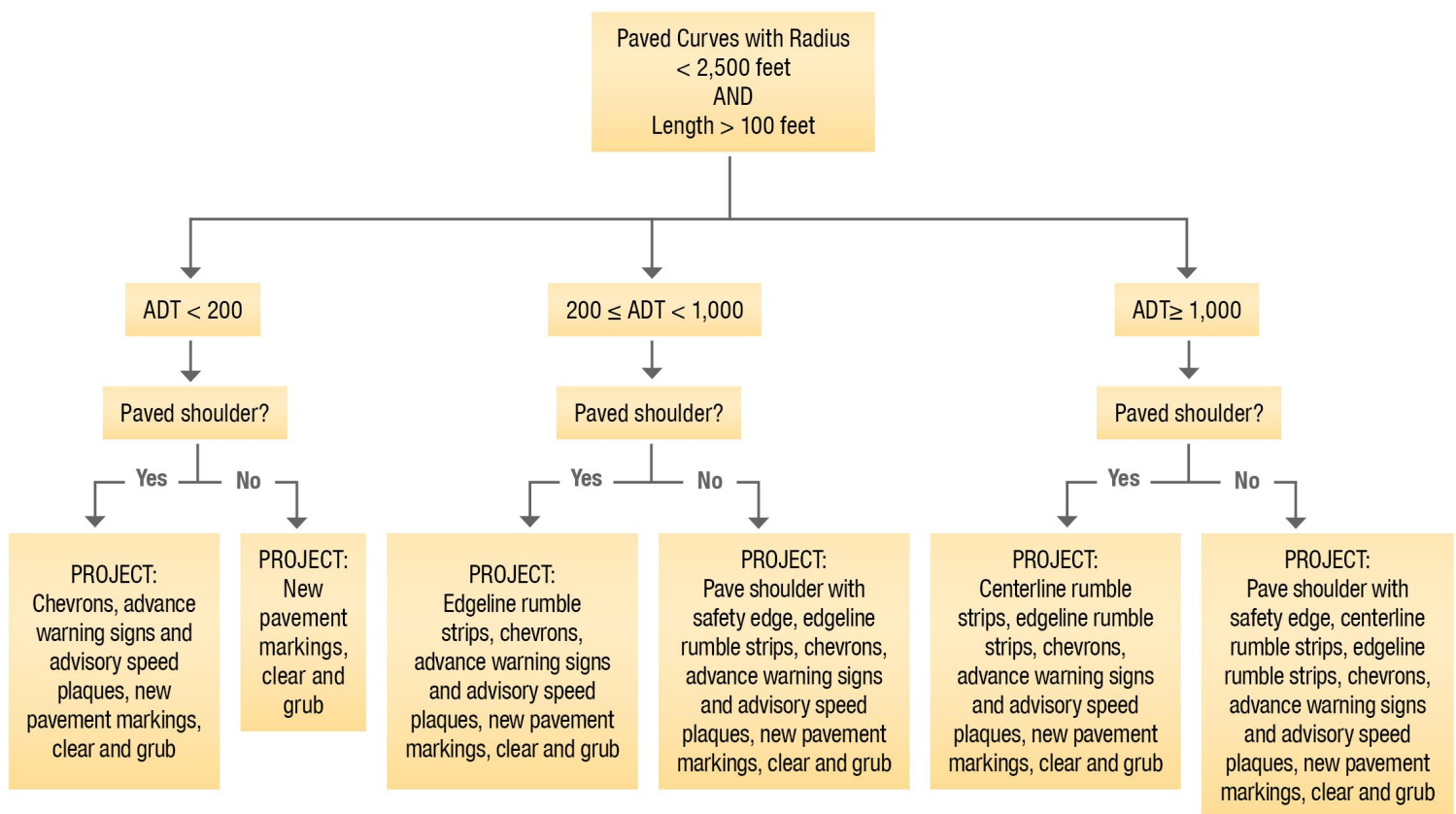
Figure 34 – County Paved Horizontal Curve Safety Improvements



6.4.4. Project Selection Decision Tree

After conducting the risk factor calculations and rankings for all paved curves within the county, and developing the curve safety countermeasures, a project selection decision tree was developed. The decision tree was utilized to develop and systemically define location-specific recommendations for the curves based on the characteristics of the curves (ADT, radius, paved shoulder, lane width, etc.). The decision tree for curve safety improvements is shown in **Figure 35**.

Each possible decision tree outcome represents a set of potential safety improvements for the curve. The decision tree was utilized to determine projects for the curves with the highest risk factor rankings. Project sheets were developed for a minimum of the ten top-scoring curves in the county. Not all improvements are recommended at all locations and the project sheets contain the recommended improvements for the specific location based on the decision tree process, existing conditions, and defined criteria.



Notes:

New edgeline pavement markings of 6" if lanes are 12' or wider; otherwise, 4" pavement markings.
Paved shoulder only recommended if existing shoulder width is greater than 2'.

Figure 35 – County Paved Horizontal Curve Project Decision Tree

6.4.5. Prioritized Curve Recommendations

After the decision tree was utilized to identify safety improvements for the curves with the greatest amount of risk factor points, project sheets were developed for these locations. The curves with the greatest amount of risk factor points are shown in **Table 21** and project sheets are located in **Appendix D2**. For curves located on a high scoring roadway segment, the GPS ID of the segment is listed in the table.

Table 21 – County Paved Horizontal Curve Prioritized Project Cost Summary

GPS ID	Curve Location	Risk Factor Points	High Scoring Segment	Estimated Project Cost
115802	Curve on THEATER RD immediately west of the intersection of US 169 & THEATER RD	18		\$ 113,000
95978/95979	Curve on NELSON AVE at the intersection of Co Rd P59/NELSON AVE & HILLTOP DR	16		\$ 11,000
102721	Curve on PARAGON AVE 2,400 ft south of the intersection of Co Rd H10/BUNGE AVE & Co Rd L35/WABASH AVE	16		\$ 9,000
18506	Curve on 200TH ST at the intersection of Co Rd D20/XAVIER AVE/200TH ST	15	2802	\$ 77,000
75149	Curve on PATTERSON FIELD RD at the intersection of GYPSUM HOLLOW RD & PATTERSON FIELD RD	15		\$ 17,000
95780	Curve on NATIONAL AVE immediately south of the intersection of Co Rd D14/170TH ST & NATIONAL AVE	15		\$ 9,000
95980	Curve on RIVERSIDE TRL at the intersection of Co Rd P59/NELSON AVE & RIVERSIDE TRL & 238TH ST	15		\$ 15,000
101930	Curve on OTHO DR 1,000 ft east of the intersection of SCHOOL ST & CIRCLE ST & HAYES ST	15		*
94303	Curve on MILL RD 2,600 ft west of the intersection of Co Rd P59/QUAIL AVE & 220TH ST	14	2866	\$ 10,000
106818	Curve on RACINE AVE at the intersection of Co Rd P73/330TH ST/RACINE AVE	14		\$ 20,000
124722	Curve on SIMPSON ST at the intersection of Co Rd D20/XAVIER AVE & SIMPSON ST & 220TH ST	14		\$ 20,000
Total (10 Curves)				\$ 301,000

* The County Engineer requested that the project sheet be removed.

Figure 36 shows the locations of the curves with the highest risk factor ranking, where project sheets and specific curve improvement recommendations were made.



Project sheets for the curves with project recommendations are included in **Appendix D2**. The risk factor ranking results and relevant data for every analyzed curve is included in **Appendix D3**.

6.4.6. Other Curve Countermeasures

The purpose of the LRSP project is to identify systemic safety improvement projects using a GIS analysis and a project selection decision tree. However, just because a safety improvement is not included within the project sheet does not mean that it should not be considered at the location. There are a variety of safety improvements that could be considered that were not included in the project decision tree due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed at curves throughout the county. **Table 22** provides a summary of several other curve safety improvements that could be considered appropriate by the county and that were included on the back side of the project sheets as additional potential improvements. The CMFs, where they have been defined, and estimated costs of these countermeasures are included in the table. Detailed descriptions of each of the countermeasures is provided in **Appendix D1**. Estimated costs for these countermeasures were noted on the back side of the project sheet at the workshop, as directed by the County Engineer. However, the County Engineer could choose to add or remove such countermeasures from consideration at any time, based on engineering judgment or new information.

Table 22 – County Paved Curve Additional Potential Improvements Summary

Safety Countermeasure	Crash Modification Factor (CMF)	Estimated Cost
Additional Curve Signage	CMF not defined	\$1,000/curve
Retroreflective Strips on Chevron Sign Posts	CMF not defined	\$100/curve
Transverse Rumble Strips Prior to Curve	0.66 Install Transverse Rumble Strips as Traffic Calming Device	\$2,000/curve
Superelevation Correction	CMF not defined	\$100,000/each
High Friction Surface Treatment (HFST)	FHWA Proven Countermeasure 0.48 - 0.76	\$150,000/mile
Speed Activated Flashers on Chevron Signs	CMF 0.59 - 0.61 Install Flashers, Chevron Signs, and Curve Warning Signs	\$2,000/each
Guardrail	0.53 - 0.56 New Guardrail Along Embankment	\$50,000/mile
On-Pavement Markings for Speed Control	CMF not defined	\$500/each
Post-Mounted Delineators	0.55 Install Edgelines, Centerlines, and Post Mounted Delineators	\$1,000/mile



6.5. Unpaved Roadways

Webster County maintains approximately 1,180 miles of county roads, of which approximately 880 miles are unpaved (74%). Unpaved road crashes accounted for 294 of the 1,785 crashes (16%) in Webster County from 2007 to 2016. Unpaved roadways were not included in the analysis based on limited data availability, low traffic volumes, and limited types of safety improvements that can be systemically implemented on unpaved roads. Even though location-specific recommendations were not made as part of this project, safety along unpaved segments, at unpaved intersections, and along unpaved curves is also important. Potential projects and/or activities that could be implemented by the County Engineer on unpaved roadways include the following items:

- Maintenance of gravel
- Major rehabilitation
- Upgrade signs
- Realign intersection
- Improve/increase shoulder/lane width
- Delineate roadside hazards with retroreflective markers
- Curve chevrons
- Advance curve warning signs and speed advisory plaques
- Driveway entrance policy
- Clear and grub
- Winter maintenance

Descriptions of each of these unpaved roadway safety countermeasures are provided in **Appendix E**.



7. HIGH CRASH LOCATIONS

While the intent of the LRSP is to identify systemic safety improvements at segments, intersections, and curves throughout the county, the following tables provide a list of high crash locations for reference. The Iowa DOT Safety Improvement Candidate Location (SICL) methodology was followed to identify these high crash locations. For the purposes of this project, the SICL methodology included 10 years of crash data, and was modified and applied to segments and curves, normalizing the analysis by crashes per mile. Due to these modifications, the crash locations in the following tables may differ from the published Iowa DOT SICL list. A summary map was developed for the county (**Figure 37**), as well as high crash location tables with a list of roadway segments (**Table 23**), intersections (**Table 24**), and curves (**Table 25**) with high crash frequency. The top ten locations were listed in the tables.

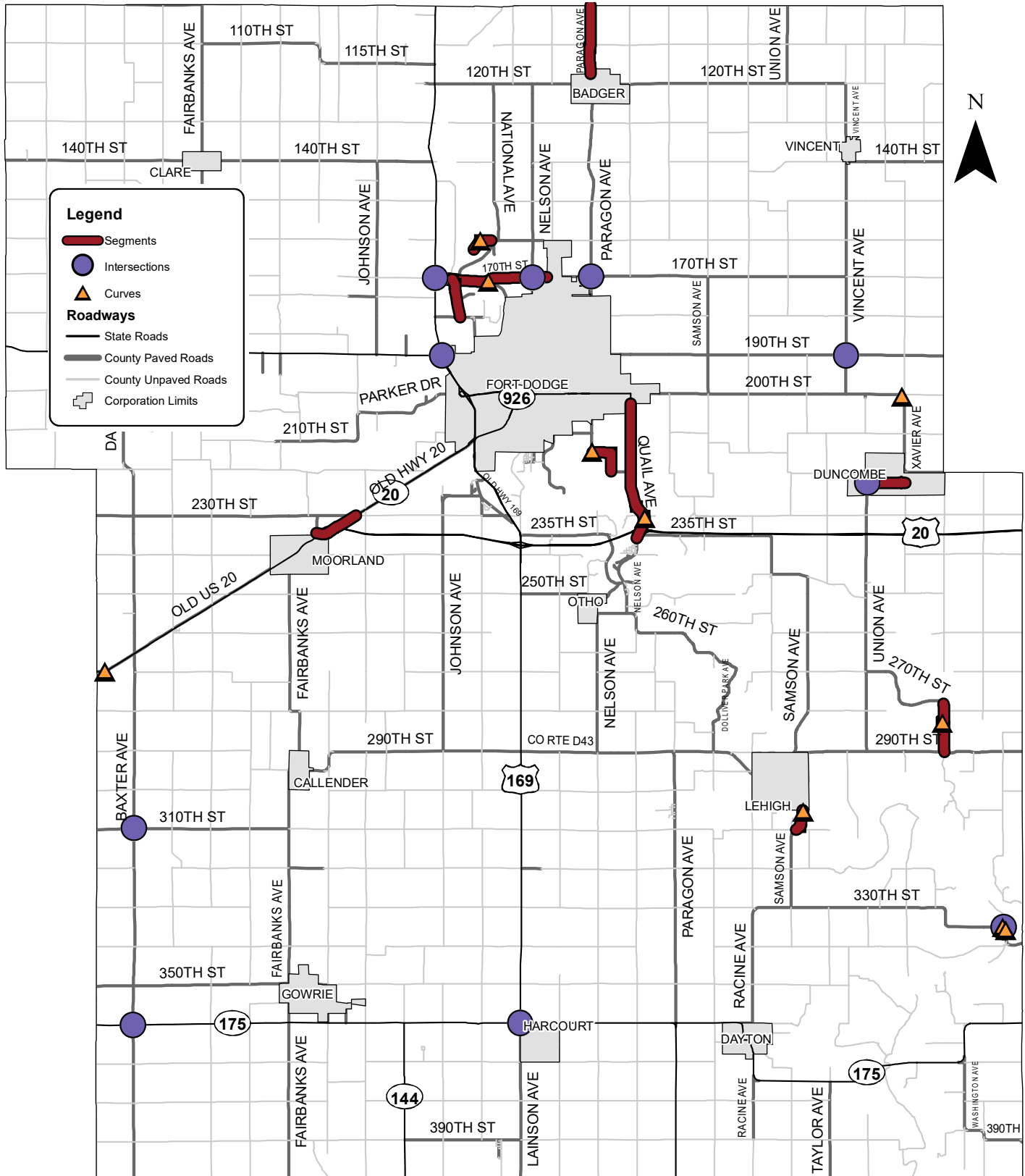


Figure 37 – LRSP Safety Improvement Candidate Locations

Table 23 – Segment Safety Improvement Candidate Locations

Rank	GPS ID	Segment	Length (mi)	High Scoring Location
1	2921	SAMSON AVE between LEHIGH CORPORATE LIMITS and 340 ft SW of 310TH ST	0.56	Yes
2	2866	MILL RD between PARAGON AVE and 220TH ST	0.95	Yes
3	2797	D14 between US 169 and 2000 ft E of NELSON AVE	2.90	Yes
4	2894	MADISON AVE between 170TH ST and 180TH ST	1.00	No
5	2809	234TH ST between 230TH ST and OLD US 20	1.15	No
6	2914	QUAIL AVE between DIVISION and MIDWAY BLVD	3.59	Yes
7	2796	160TH ST between ORCHARD RD and END OF ROAD	0.56	No
8	2827	BRUSHY CREEK ST REC AREA between 290TH ST and 900 ft N of 280TH ST	1.26	No
9	2911	PARAGON AVE between 1350 ft N of W CENTER AVE and HUMBOLDT-WEBSTER COUNTY LINE	1.75	No
10	2936	WALNUT ST between UNION AVE and SIMPSON ST	0.98	No

Table 24 – Intersection Safety Improvement Candidate Locations

Rank	GPS ID	Intersection	Control Type	High Scoring Location
1	564040	Co Rd D18/190TH ST & Co Rd P71/VINCENT AVE	Two-way stop	No
2	564096	Co Rd D14/170TH ST & Co Rd P59/PARAGON AVE	Two-way stop	No
3	562967	IA 175/360TH ST & Co Rd P29/BAXTER AVE	Two-way stop	Yes
4	562769	US 169 & IA 7/190TH ST & 3RD AVE NW	All-way stop	No
5	565095	WALNUT ST & CO RD P73	One-way stop	No
6	564098	Co Rd D14/170TH ST & Co Rd P56/NELSON AVE	Two-way stop	No
7	704672	US 169/360TH ST/LAINSON AVE & IA 175 & Co Rd P46	All-way stop	Yes
8	563529	Co Rd D54/330TH ST/XAVIER AVE & XAVIER DR	One-way stop	No
9	563654	Co Rd D46/310TH ST & Co Rd P29/BAXTER AVE	Two-way stop	No
10	562785	US 169 & Co Rd D14/170TH ST	Two-way stop	No



Table 25 – Curve Safety Improvement Candidate Locations

Rank	GPS ID	Curve Location	Nearest Town	Length (ft)	Radius (ft)	High Scoring Location
1	102721	Curve on PARAGON AVE 2,400 ft south of the intersection of Co Rd H10/BUNGE AVE & Co Rd L35/WABASH AVE	Fort Dodge	164	145	Yes
2	124699	Curve on XAVIER AVE immediately south of the intersection of Co Rd D54/330TH ST/XAVIER AVE & XAVIER DR	Stratford	984	945	No
3	58286	Curve on BRUSHY CREEK ST REC AREA 1,000 ft south of the intersection of BRUSHY CREEK ST REC AREA	Lehigh	1,194	367	No
4	100351	Curve on OLD US 20 700 ft east of the intersection of Co Rd D36/270TH ST & ADAMS AVE	Somers	778	1,353	No
5	18506	Curve on 200TH ST at the intersection of Co Rd D20/XAVIER AVE/200TH ST	Duncombe	1,243	1,083	Yes
6	95780	Curve on NATIONAL AVE immediately south of the intersection of Co Rd D14/170TH ST & NATIONAL AVE	Fort Dodge	156	192	Yes
7	10792	Curve on 160TH ST 1,400 ft west of the intersection of ORCHARD RD & 160TH ST	Fort Dodge	107	132	No
8	41303	Curve on 330TH ST at the intersection of Co Rd D54/330TH ST/XAVIER AVE & XAVIER DR	Stratford	154	439	No
9	63429	Curve on SAMSON AVE 1,800 ft south of the intersection of Co Rd D54/330TH ST/XAVIER AVE & XAVIER DR	Lehigh	276	515	No
10	105570	Curve on QUAIL AVE immediately north of the intersection of US 20/NE RAMP CURV/NW RAMP CURV & Co Rd P59/QUAIL AVE	Fort Dodge	1,601	1,247	No



8. SUMMARY

The Webster County LRSP was developed to aid the County Engineer in identifying and prioritizing roadway segments, intersections, and curves for safety improvements. The LRSP followed a data-driven process to develop systemic safety improvements on Webster County paved roads. The LRSP was developed through a seven-step process that included gathering background information, data collection, data analysis, countermeasure selection, project development, county input, and development of the LRSP.

- **Gather Background Information:** The Iowa SHSP was reviewed and data requests were made of the counties to provide the location and presence of rumble strips, destination lighting, stop signs, and other pertinent safety improvements.
- **Data Collection:** A comprehensive GIS project database was developed utilizing the following databases as provided by Iowa DOT, the county, or collected as part of this project:
 - Crash database
 - Roadway database
 - Access point database (911 address database)
 - Pavement management database
 - Roadside hazard database
 - Horizontal curve database
 - County stop sign database
 - Intersection database
- **Data Analysis:** After development of the comprehensive GIS project database, the crash data was analyzed for the county. Crashes were compared to the SHSP Key Safety Emphasis Areas for the State of Iowa, and crash trees and maps were prepared for the county.
- **Countermeasure Selection:** Following data analysis, a workshop was held with the safety stakeholders of the county. Prior to the workshop, a list of safety topics was developed and distributed to the counties to gather input on driver-related safety countermeasure implementation within their jurisdictions. At the workshop, driver-related countermeasures were reviewed and stakeholders discussed existing and proposed driver-related countermeasures.
- **Develop Projects for Inclusion into the LRSP:** A risk factor ranking process was developed for segments, intersections, and curves, and risk factor scores were calculated for all the segments, intersections, and curves within Webster County. After conducting the risk factor analysis, safety improvement recommendations were developed for the feature types based on the project selection decision trees and summarized in location-specific project sheets. These project sheets, detailing the recommended safety improvements at specific locations, were then provided to the County Engineer for review.
- **County Input:** The draft project sheets were reviewed at the county workshop. The County Engineer provided input for additional safety countermeasures based on engineering judgment and site-specific knowledge.
- **Develop LRSPs:** An LRSP was developed for Webster County including a summary of the LRSP process along with recommended safety projects for implementation by the county.



8.1. Recommended Improvements

This LRSP identified driver-related countermeasures in addition to engineering-related countermeasures. The following sections summarize the recommended countermeasures and improvements for Webster County.

8.1.1. Driver-Related Countermeasures

During the county workshop, attendees were provided information regarding fatal and serious injury crashes within the county and how that data aligned with the Iowa SHSP Key Safety Emphasis Areas. Potential countermeasures from the *NCHRP Report 500 Series* and the *Toward Zero Deaths* documents as well as information obtained from Phase 1 and Phase 2 were provided to stakeholders to facilitate discussion on what action items were currently underway in the county with respect to driver-related crashes. Countermeasures were grouped according to the 2013 Iowa SHSP 10 Key Safety Emphasis Areas, of which six are driver-related emphasis areas:

- Speed-related
- Unprotected persons
- Younger drivers
- Impaired driving
- Older drivers
- Inattentive/distracted driving

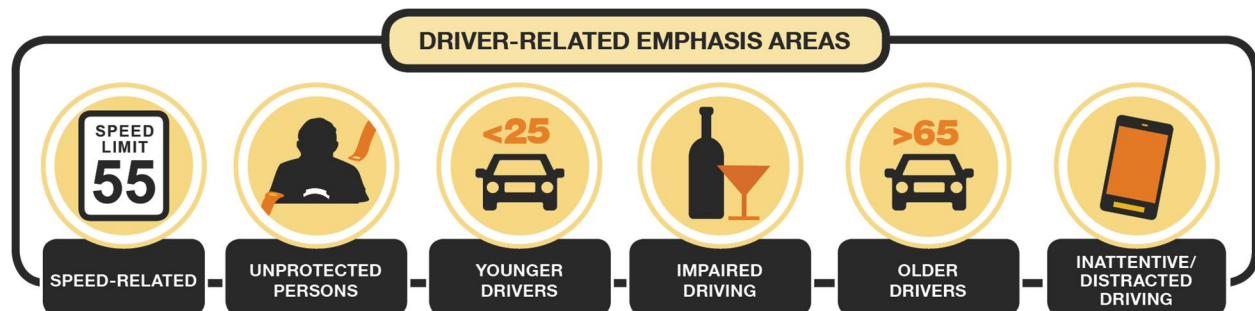


Figure 38 – Iowa SHSP Driver-Related Emphasis Areas

Based on discussions at the workshop, the following implementation statuses were defined for various driver-related countermeasures in the County: Underway/Ongoing, Area for Improvement, Opportunity, or Completed in the Past.

Table 26 provides a summary of the status of implementation of the driver-related countermeasures within the county. It is recommended that the county continue to implement countermeasures that are currently underway/ongoing, and look for opportunities to implement additional countermeasures that are not currently being implemented. This will require input and coordination from all of the five E's of safety.



Table 26 – County Driver-Related Countermeasure Summary

Countermeasure	Status
Speed-Related	
Conduct targeted speed enforcement	Opportunity
Prosecute and impose sanctions on drivers not obeying school bus stop bars	Opportunity
Conduct education and awareness campaigns	Opportunity
Unprotected Persons	
Conduct targeted enforcement of restraint use	Area for Improvement
Instruction in proper child restraint use	Underway/Ongoing
Check for proper child restraint use in all motorist encounters	Underway/Ongoing
Positive Reinforcement	Underway/Ongoing
Conduct education and awareness campaigns	Opportunity
Younger Drivers	
Enforcement of graduated driver's license laws	Underway/Ongoing
Mock prom disaster events	Completed in the Past
Additional training in schools	Opportunity
Conduct education and awareness campaigns	Opportunity
Impaired Driving	
Conduct targeted OWI enforcement	Underway/Ongoing
Conduct safety checkpoints	Opportunity
Compliance checks for alcohol sales	Underway/Ongoing, Opportunity
Alternative transportation choices	Underway/Ongoing
Prosecute, impose sanctions on, and treat OWI offenders	Area for Improvement
Conduct education and awareness campaigns	Opportunity
Older Drivers	
Promote safe mobility choices	Opportunity
Encourage external reporting of at-risk drivers to licensing authorities	Underway/Ongoing
Conduct education and awareness campaigns	Opportunity
Inattentive/Distracted Driving	
Visibly enforce existing statutes to deter distracted driving	Opportunity
Agency policy for hands-free devices	Opportunity
Mobile simulator for distracted driving	Underway/Ongoing
Conduct education and awareness campaigns	Opportunity



8.1.2. Engineering Countermeasures

In addition to the driver-related countermeasures, engineering projects were developed for roadway segments, intersections, and horizontal curves on county paved roads that had high risk factor rankings based on the analysis methodology. **Table 27** provides a cost summary of the projects developed for the county.

Table 27 – Engineering Countermeasures Cost Summary

Facility Type	Number of Locations	Estimated Project Cost
Segments	15	\$3,563,000
Intersections	14	\$637,000
Curves	10	\$301,000
Total Improvement Costs	39	\$4,501,000

8.2. Implementation

One of the goals of the LRSP project is to provide a document that is usable and can be frequently consulted by the County Engineer to aid in requesting funding and in the completion of traffic safety improvement projects on county-maintained roads. This section describes some recommendations on how this plan can be implemented within the county.

The project sheets developed and provided in **Appendix B2**, **Appendix C2**, and **Appendix D2** are intended to be used as a straightforward way to apply for safety improvement funding through HSIP-S. The recommendations contained within the project sheets lend themselves well to HSIP-S funding because they were developed based on a proactive risk factor assessment, with a focus on reducing the potential for fatal and serious injury crashes.

Additionally, there is a list of high-crash locations contained within **Section 4.6** of this document. It is recommended that the County Engineer consider applying for TSIP funding at these locations because TSIP funding considers benefit-cost analysis. The County Engineer can review these locations to determine if safety improvements, similar to the ones outlined within **Section 6.2**, **Section 6.3**, and **Section 6.4** are applicable, and develop a TSIP application based on the recommended improvements.

The County Engineer should also review the projects within the Five-Year Program and consider including safety recommendations from the project sheets into those projects, where applicable. In future cycles of the Five-Year Program, it is recommended that the safety projects included on the project sheets be considered for inclusion in the program.

The County Engineer should also consider consulting the LRSP when developing a project for design or addressing a maintenance issue, in order to incorporate the types of safety improvement recommendations in the LRSP and in the project sheets. Doing so can help prioritize projects and emphasize safety in design and maintenance.

Finally, the LRSP can be consulted during routine maintenance activities such as striping and mowing (clearing and grubbing). The document can be used to provide instruction or education to maintenance crews about the safety implications of their work.



8.3. Next Steps

Project sheets containing the prioritized list of projects have been provided in **Appendix B2**, **Appendix C2**, and **Appendix D2** to aid the County Engineer in obtaining funding for safety improvements and/or for incorporating recommendations into planned roadway improvement projects. These sheets may require updating for funding applications in future years. The County Engineer may also make changes to the prepared project sheets based on local knowledge of the site, available funding, and/or specific needs.

It is recommended that the county continue to foster cooperation with other stakeholders and look for opportunities to improve and expand implementation of driver-related countermeasures. The county should continue its history of implementing a number of safety improvement projects annually. Based on current funding levels, it is anticipated that many of the engineering improvements listed in this plan could be implemented within five to ten years, or sooner. Additionally, this LRSP should be updated within five to ten years to reflect improvements that have been implemented, additional availability of roadway feature data, and changes in crash types and patterns.

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9. 2023 UPDATE

9.1. County Progress

Webster County will measure progress of their LRSP through two different methods: tracking fatalities and serious injuries using the Iowa Crash Analysis Tool (ICAT) along with documenting completion of projects identified within the LRSP.

After April 15th of each year, the county will update the table of fatalities and serious injuries to track their progress towards zero fatalities and serious injuries. **Table 28** contains a summary of fatalities and serious injuries for the county from 2012 to 2021.

Table 28 – County Tracking of Fatalities and Serious Injuries

Year	Fatalities	Serious Injuries	Fatalities and Serious Injuries
2012	10	22	32
2013	6	23	29
2014	2	11	13
2015	7	23	30
2016	7	23	30
2017	5	28	33
2018	9	19	28
2019	10	12	22
2020	3	17	20
2021	5	15	20

Source: Iowa Crash Analysis Tool (ICAT), <https://icat.iowadot.gov/>, accessed September 21, 2022.

At the same time the county updates its fatalities and serious injuries, the county will also provide a list of prioritized projects that have been completed as identified within the LRSP. Since the completion of the LRSP, the recommended projects have yet to be completed.

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APPENDIX A

RECOMMENDATIONS KEY MAP



APPENDIX B1

SEGMENT SAFETY COUNTERMEASURES

This appendix summarizes the **segment** safety countermeasures for consideration and provides detailed descriptions for each countermeasure from both the project selection decision tree as well as the additional potential improvements listed on the back side of the project sheets.

SEGMENT COUNTERMEASURES FROM PROJECT SELECTION DECISION TREE

The countermeasures in this section were included in the project selection decision tree and recommended on the segment project sheets based on the criteria described in **Section 6.2.1**.

Conduct an RSA

An RSA is a formal safety performance examination that reviews, in detail, the geometry of a roadway facility. As part of an RSA, an independent, multi-disciplinary team assesses the condition of a given roadway and provides short-, mid-, and long-term recommendations for safety improvements for all modes currently, or planned to be provided by the facility. RSAs have been conducted throughout the United States and are generally accepted as a proactive, low-cost approach to improve safety. This countermeasure cost estimate does not include the cost of implementing the recommendations of the RSA.

Conduct Access Control Analysis

An access control analysis can aid in determining access management decisions along a corridor. This countermeasure is intended to provide additional information on a specific facility as to the most appropriate access control treatments. Consolidating driveways reduces the number of conflict points on a given roadway and concentrates access where through-drivers can expect and anticipate left and/or right-turning vehicles, thus improving safety. The cost estimate associated with this countermeasure does not include implementing the findings of the access control analysis.

New Pavement Markings

This safety countermeasure includes new pavement markings along the segment for the centerline and edgelines. The updated markings can clarify and further delineate the roadway, reducing the risk of a lane departure crash. If the existing lanes were 12 feet or wider, new edgeline pavement markings of six inches were recommended; otherwise, new four-inch pavement markings were recommended. Research suggests that widening pavement markings from four to six inches in rural areas results in CMFs from 0.64 to 0.83.

Edgeline Rumble Strips

Edgeline rumble strips provide tactile and audible warning to a driver if they are beginning to depart the lane. This safety improvement has recorded CMFs in the range of 0.61 to 0.67. Depending on the conditions of the roadway, the County Engineer may choose to install rumble strips placed in the shoulder offset from the edgeline, or they may place the rumble strips on the edgeline and provide pavement markings over them, resulting in edgeline rumble stripes. For purposes of this document, both will be called rumble strips.

Centerline Rumble Strips

CMFs of 0.55 to 0.91 represent the safety benefit from the installation of centerline rumble strips. In Iowa, rumble strips placed in the centerline of the roadway generally have pavement markings over them. To be consistent with the Iowa DOT Design Manual 3C-5, centerline rumble strips will



be referred to as rumble strips even though in circumstances they may technically be “rumble stripes”. This safety improvement provides an audible and tactile warning to drivers when crossing the centerline and can aid in the avoidance of some high severity lane departure crashes.

Pave Shoulder with Safety Edge

Constructing or increasing the width of an existing paved shoulder can reduce the potential for a severe crash as the result of a lane departure. CMFs associated with paving the shoulder in rural areas range from 0.82 to 0.9. At locations where paved shoulders are recommended, it is suggested that the County Engineer consider a minimum of a two-foot shoulder; however, based on right-of-way and roadway characteristics, the County Engineer may choose to install a wider shoulder.

According to the FHWA, a Safety Edge is “a simple but effective solution that can help save lives by allowing drivers who drift off [roadways] to return to the road safely. Instead of a vertical drop-off, the Safety Edge shapes the edge of pavement to 30 degrees.” The installation of a Safety Edge has CMFs of 0.85 - 0.92.

Clear and Grub

This countermeasure includes clearing and grubbing the areas within the clear zone of the roadway (defined here as 15 feet on each side of the road). This safety countermeasure decreases the hazard of a run off the road crash by reducing the number of obstructions a vehicle could impact after a lane departure. A 0.78 CMF has been documented as distance from roadside features was increased.

*For descriptions on curve countermeasures see **Appendix D1**.*

OTHER SEGMENT COUNTERMEASURES

Safety improvements not included on the first page of the roadway segment project sheet may still merit consideration at a specific location. There are a variety of other safety improvements that could be considered that were not included in the project selection decision tree due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed at road segments throughout the county. The following sections describe several other roadway segment safety improvements that could be considered appropriate by the county and that were included on the back side of the project sheets.

Flattening and Widening Foreslopes

This improvement includes flattening the foreslopes of the roadway edge from 2V:1H (typical) to 3V:1H to increase the ability of a driver after a lane departure to return to the roadway safely. CMFs for flattening side slopes are in the range of 0.9, while flattening to 4:1 or 6:1 are in the range of 0.58 to 0.71.

On-pavement Markings for Speed Control

This improvement includes painting the speed limit on the pavement to reinforce the posted speed limit. On-pavement markings can serve as additional information and reminders to drivers of the posted speed limit and the importance of observing their speed.

Delineate Roadside Hazards with Retroreflective Markers

Retroreflective markers can be applied to roadside objects and trees, increasing the visibility of hazards and helping delineate the roadway where minimal delineation may exist.

Guardrail

Installing guardrail can help redirect vehicles after a lane departure to remain on the roadway and avoid roadside hazards. CMFs in the range of 0.53 to 0.56 have been recorded for installing new guardrail along an embankment.

Post-Mounted Delineators

As stated in the MUTCD, “delineators are particularly beneficial at locations where the [roadway] alignment might be confusing or unexpected, such as at lane-reduction transitions and curves. Delineators are effective guidance devices at night and during adverse weather. An important advantage of delineators in certain locations is that they remain visible when the roadway is wet or snow covered.” Providing post-mounted retroreflective delineators along the roadway can give additional information to drivers as to the location of the roadside edge and alignment. The CMF for installing post-mounted delineators in combination with edgelines and centerlines has been recorded at 0.55.

Remove/Relocate Objects in Hazardous Locations

This countermeasure includes removing or relocating objects from within the clear zone of the roadside. This allows drivers who run off the road to potentially return to the road or have a less severe consequence when departing the roadway. A CMF of 0.62 is associated with this countermeasure.

*For descriptions on additional curve countermeasures see **Appendix D1**.*

APPENDIX B2
SEGMENT PROJECT SHEETS

Local Road Safety Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: 15



Project Name: DOLLIVER PARK AVE between QUAIL AVE and 200 ft NE of DOLLIVER MEMORIAL
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
 Checked By: MMO

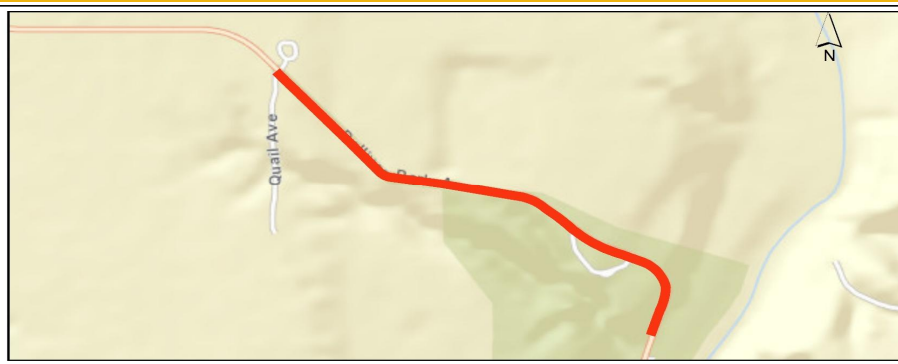
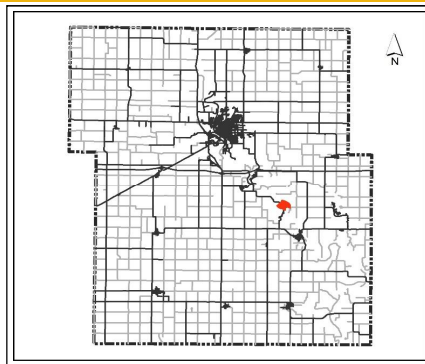
SEGMENT

Location Description

Road: DOLLIVER PARK AVE
 From: QUAIL AVE
 To: 200 ft NE of DOLLIVER MEMORIAL
 Length (miles): 0.79

GPS ID: 2865

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	280	1
Pavement Shoulder Width (ft)	24' 1'	2
Average Roadside Risk	4.57	4
Access Points per Mile	6.4	3
High Risk Curve Density/Mile	2.5	2
Avg. Pavement Condition (IRI)	162	1
Lane Departure Crashes	1	2
Total Risk Factor Points (23 max)		15

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	1
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	2
Curves with Chevrons	3

Crash Data, 2007-2016	
Total Crashes	7
K and A Crashes	0
Lane Departure Crashes	1
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	872.1
K and A Crash Rate (per HMVMT)	0.0

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Assessment (RSA)	0	EA	\$ 30,000	\$ -
Conduct Access Control Analysis	0	EA	\$ 30,000	\$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,200	\$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.79	MILE	\$ 1,800	\$ 1,413
Install 4" Retroreflective Centerline	0.79	MILE	\$ 800	\$ 628
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	\$ 65,000	\$ -
Install Edgeline Rumble Strips (Both Sides of Road)	0.79	MILE	\$ 2,500	\$ 1,963
Install Centerline Rumble Strips	0.00	MILE	\$ 1,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	3	CURVE	\$ 2,500	\$ 7,500
Clear and Grub (15 ft Both Sides of Road)**	0.79	MILE	\$ 10,000	\$ 7,851
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 19,355

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Roadway Segment Improvements****Risk Factor Points: 15**

Project Name: DOLLIVER PARK AVE between QUAIL AVE and 200 ft NE of DOLLIVER MEMORIAL
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID: 2865**

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	\$ 75,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Delineate Roadside Hazards (trees or utility poles) with Retroreflective Tape		EA	\$ 15	\$ -
Guardrail		MILE	\$ 50,000	\$ -
Post-Mounted Delineators		MILE	\$ 4,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed		CURVE	\$ 5,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		EA	\$ 2,000	\$ -
Remove/Relocate Objects in Hazardous Locations		EA	\$ 1,000	\$ -
Superelevation Correction on Curves		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 19,355
Subtotal:				\$ 19,355
Mobilization: (% +/-)*			10%	\$ 2,500
Traffic Control: (% +/-)			5%	\$ 1,029
Contingency: (% +/-)			20%	\$ 4,116
Estimated Project Cost				\$ 27,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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Project Description Form Disclaimer:

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End of Project Description

Back Page

Local Road Safety Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: 13



Project Name: 120TH ST between 1280 ft W of US 169 and 2610 ft E of OATES AVE
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
 Checked By: MMO

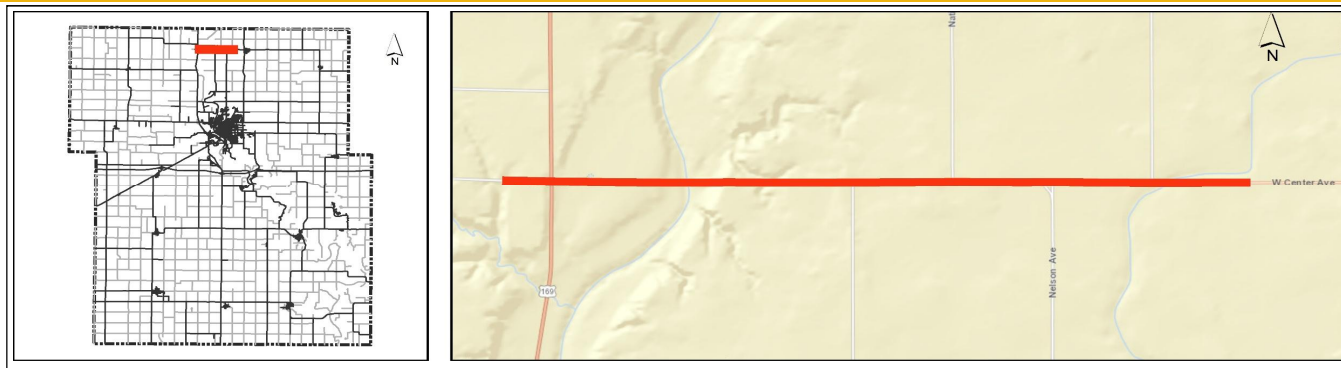
SEGMENT

Location Description

Road: 120TH ST
 From: 1280 ft W of US 169
 To: 2610 ft E of OATES AVE
 Length (miles): 3.74

GPS ID: 2790

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1,856	6
Pavement Shoulder Width (ft)	24' 10'	0
Average Roadside Risk	1.63	2
Access Points per Mile	5.9	2
High Risk Curve Density/Mile	0.0	0
Avg. Pavement Condition (IRI)	144	1
Lane Departure Crashes	5	2
Total Risk Factor Points (23 max)		13

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	10
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	0
Curves with Chevrons	0

Crash Data, 2007-2016	
Total Crashes	49
K and A Crashes	2
Lane Departure Crashes	5
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	193.5
K and A Crash Rate (per HMVMT)	7.9

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Assessment (RSA)	0	EA	\$ 30,000	\$ -
Conduct Access Control Analysis	0	EA	\$ 30,000	\$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,200	\$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	3.74	MILE	\$ 1,800	\$ 6,729
Install 4" Retroreflective Centerline	3.74	MILE	\$ 800	\$ 2,990
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	3.74	MILE	\$ 65,000	\$ 242,976
Install Edgeline Rumble Strips (Both Sides of Road)	3.74	MILE	\$ 2,500	\$ 9,345
Install Centerline Rumble Strips	3.74	MILE	\$ 1,000	\$ 3,738
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 2,500	\$ -
Clear and Grub (15 ft Both Sides of Road)**	3.74	MILE	\$ 7,500	\$ 28,036
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 293,814

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Roadway Segment Improvements****Risk Factor Points: 13**

Project Name: 120TH ST between 1280 ft W of US 169 and 2610 ft E of OATES AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID: 2790**

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	\$ 75,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Delineate Roadside Hazards (trees or utility poles) with Retroreflective Tape		EA	\$ 15	\$ -
Guardrail		MILE	\$ 50,000	\$ -
Post-Mounted Delineators		MILE	\$ 4,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed		CURVE	\$ 5,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		EA	\$ 2,000	\$ -
Remove/Relocate Objects in Hazardous Locations		EA	\$ 1,000	\$ -
Superelevation Correction on Curves		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 293,814
Subtotal:				\$ 293,814
Mobilization: (% +/-)* 10%				\$ 29,390
Traffic Control: (% +/-) 5%				\$ 14,759
Contingency: (% +/-) 20%				\$ 59,037
Estimated Project Cost				\$ 397,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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Project Description Form Disclaimer:

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End of Project Description

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Local Road Safety Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: 13



Project Name: D14 between US 169 and 2000 ft E of NELSON AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT

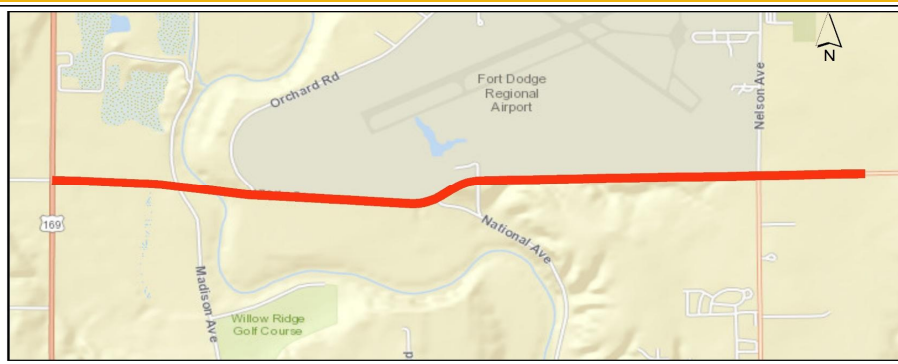
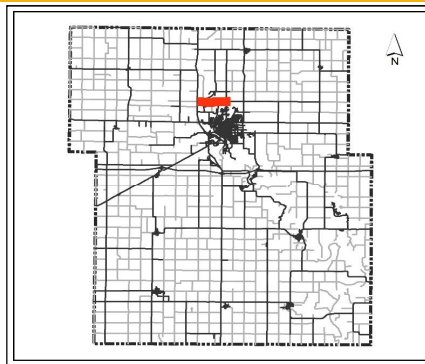
Location Description

GPS ID: 2797

Road: D14
From: US 169
To: 2000 ft E of NELSON AVE
Length (miles): 2.90

This segment contains the following high scoring intersections: GPS IDs 564105 and 564208

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	2,602	6
Pavement Shoulder Width (ft)	24' 6'	0
Average Roadside Risk	1.56	2
Access Points per Mile	8.3	3
High Risk Curve Density/Mile	0.0	0
Avg. Pavement Condition (IRI)	90	0
Lane Departure Crashes	5	2
Total Risk Factor Points (23 max)		13

Other Information	
Paved Shoulder	Yes
Shoulder Width (ft)	6
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	0
Curves with Chevrons	2

Crash Data, 2007-2016	
Total Crashes	77
K and A Crashes	6
Lane Departure Crashes	5
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	279.0
K and A Crash Rate (per HMVMT)	21.7

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Assessment (RSA)	1	EA	\$ 30,000	\$ 30,000
Conduct Access Control Analysis	0	EA	\$ 30,000	\$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,200	\$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	2.90	MILE	\$ 1,800	\$ 5,227
Install 4" Retroreflective Centerline	2.90	MILE	\$ 800	\$ 2,323
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	\$ 65,000	\$ -
Install Edgeline Rumble Strips (Both Sides of Road)	2.90	MILE	\$ 2,500	\$ 7,260
Install Centerline Rumble Strips	2.90	MILE	\$ 1,000	\$ 2,904
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	2	CURVE	\$ 2,500	\$ 5,000
Clear and Grub (15 ft Both Sides of Road)**	2.90	MILE	\$ 7,500	\$ 21,781
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 74,495

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Roadway Segment Improvements****Risk Factor Points: 13**

Project Name: D14 between US 169 and 2000 ft E of NELSON AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID: 2797**

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	\$ 75,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Delineate Roadside Hazards (trees or utility poles) with Retroreflective Tape		EA	\$ 15	\$ -
Guardrail		MILE	\$ 50,000	\$ -
Post-Mounted Delineators		MILE	\$ 4,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed		CURVE	\$ 5,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		EA	\$ 2,000	\$ -
Remove/Relocate Objects in Hazardous Locations		EA	\$ 1,000	\$ -
Superelevation Correction on Curves		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 74,495
Subtotal:				\$ 74,495
Mobilization: (% +/-)*			10%	\$ 7,450
Traffic Control: (% +/-)			5%	\$ 3,811
Contingency: (% +/-)			20%	\$ 15,244
Estimated Project Cost				\$ 101,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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End of Project Description

Back Page

Local Road Safety Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: 12



Project Name: NELSON AVE between 590 ft N of 31ST AVE N and 120TH ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

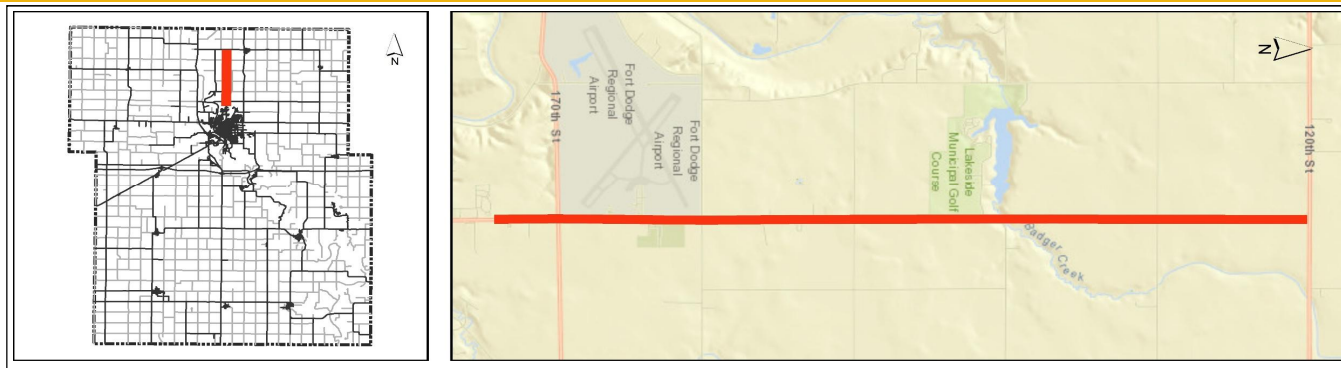
SEGMENT

Location Description

GPS ID: 2899

Road: NELSON AVE
From: 590 ft N of 31ST AVE N
To: 120TH ST
Length (miles): 5.34

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	2,697	6
Pavement Shoulder Width (ft)	24' 4'	0
Average Roadside Risk	1.02	0
Access Points per Mile	9.4	3
High Risk Curve Density/Mile	0.0	0
Avg. Pavement Condition (IRI)	124	1
Lane Departure Crashes	3	2
Total Risk Factor Points (23 max)		12

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	4
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	0
Curves with Chevrons	0

Crash Data, 2007-2016	
Total Crashes	73
K and A Crashes	4
Lane Departure Crashes	3
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	138.7
K and A Crash Rate (per HMVMT)	7.6

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Assessment (RSA)	0	EA	\$ 30,000	\$ -
Conduct Access Control Analysis	0	EA	\$ 30,000	\$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,200	\$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	5.34	MILE	\$ 1,800	\$ 9,617
Install 4" Retroreflective Centerline	5.34	MILE	\$ 800	\$ 4,274
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	5.34	MILE	\$ 65,000	\$ 347,295
Install Edgeline Rumble Strips (Both Sides of Road)	5.34	MILE	\$ 2,500	\$ 13,358
Install Centerline Rumble Strips	5.34	MILE	\$ 1,000	\$ 5,343
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 2,500	\$ -
Clear and Grub (15 ft Both Sides of Road)**	5.34	MILE	\$ 5,000	\$ 26,715
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 406,602

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Roadway Segment Improvements****Risk Factor Points: 12**

Project Name: NELSON AVE between 590 ft N of 31ST AVE N and 120TH ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID: 2899**

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	\$ 75,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Delineate Roadside Hazards (trees or utility poles) with Retroreflective Tape		EA	\$ 15	\$ -
Guardrail		MILE	\$ 50,000	\$ -
Post-Mounted Delineators		MILE	\$ 4,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed		CURVE	\$ 5,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		EA	\$ 2,000	\$ -
Remove/Relocate Objects in Hazardous Locations		EA	\$ 1,000	\$ -
Superelevation Correction on Curves		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 406,602
Subtotal:				\$ 406,602
Mobilization: (% +/-)*			10%	\$ 40,670
Traffic Control: (% +/-)			5%	\$ 20,346
Contingency: (% +/-)			20%	\$ 81,382
Estimated Project Cost				\$ 549,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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Project Description Form Disclaimer:

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End of Project Description

Back Page

Local Road Safety Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: 11



Project Name: MILL RD between PARAGON AVE and 220TH ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT

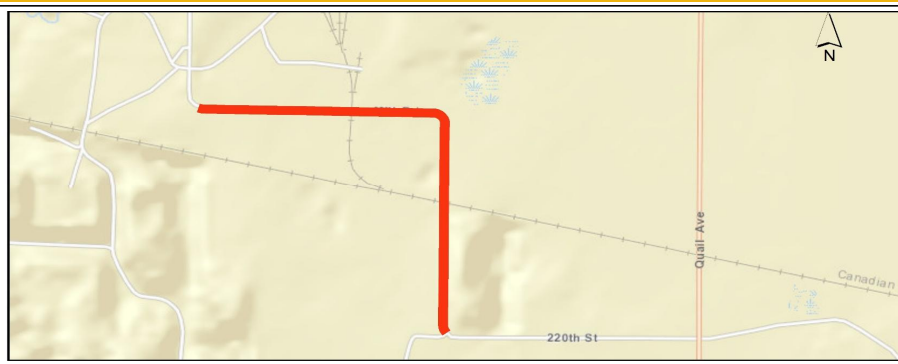
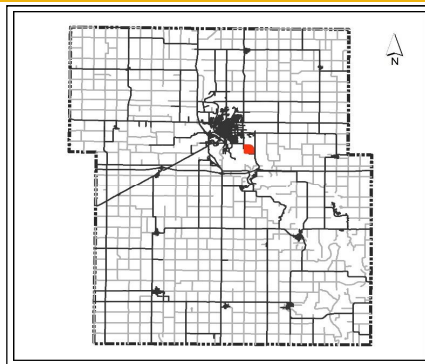
Location Description

GPS ID: 2866

Road: MILL RD
From: PARAGON AVE
To: 220TH ST
Length (miles): 0.95

This segment contains the following high scoring curve: GPS ID 94303

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1,730	6
Pavement Shoulder Width (ft)	22' 3'	0
Average Roadside Risk	2.20	2
Access Points per Mile	2.1	0
High Risk Curve Density/Mile	0.0	0
Avg. Pavement Condition (IRI)	119	1
Lane Departure Crashes	5	2
Total Risk Factor Points (23 max)		11

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	3
Speed Limit (mph)	40
Lane Width (ft)	11
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	0
Curves with Chevrons	2

Crash Data, 2007-2016	
Total Crashes	28
K and A Crashes	3
Lane Departure Crashes	5
Lane Departure K and A Crashes	1
Total Crash Rate (per HMVMT)	465.4
K and A Crash Rate (per HMVMT)	49.9

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Assessment (RSA)	1	EA	\$ 30,000	\$ 30,000
Conduct Access Control Analysis	0	EA	\$ 30,000	\$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.95	MILE	\$ 1,200	\$ 1,143
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,800	\$ -
Install 4" Retroreflective Centerline	0.95	MILE	\$ 800	\$ 762
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.95	MILE	\$ 65,000	\$ 61,909
Install Edgeline Rumble Strips (Both Sides of Road)	0.95	MILE	\$ 2,500	\$ 2,381
Install Centerline Rumble Strips	0.95	MILE	\$ 1,000	\$ 952
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	2	CURVE	\$ 2,500	\$ 5,000
Clear and Grub (15 ft Both Sides of Road)**	0.95	MILE	\$ 7,500	\$ 7,143
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 109,290

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Roadway Segment Improvements****Risk Factor Points: 11**

Project Name: MILL RD between PARAGON AVE and 220TH ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID: 2866**

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Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	\$ 75,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Delineate Roadside Hazards (trees or utility poles) with Retroreflective Tape		EA	\$ 15	\$ -
Guardrail		MILE	\$ 50,000	\$ -
Post-Mounted Delineators		MILE	\$ 4,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed		CURVE	\$ 5,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		EA	\$ 2,000	\$ -
Remove/Relocate Objects in Hazardous Locations		EA	\$ 1,000	\$ -
Superelevation Correction on Curves		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 109,290
Subtotal:				\$ 109,290
Mobilization: (% +/-)*			10%	\$ 10,930
Traffic Control: (% +/-)			5%	\$ 5,556
Contingency: (% +/-)			20%	\$ 22,224
Estimated Project Cost				\$ 148,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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End of Project Description

Back Page

Local Road Safety Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: 11



Project Name: MADISON AVE between 1010 ft N of 6TH AVE NW and 180TH ST
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
 Checked By: MMO

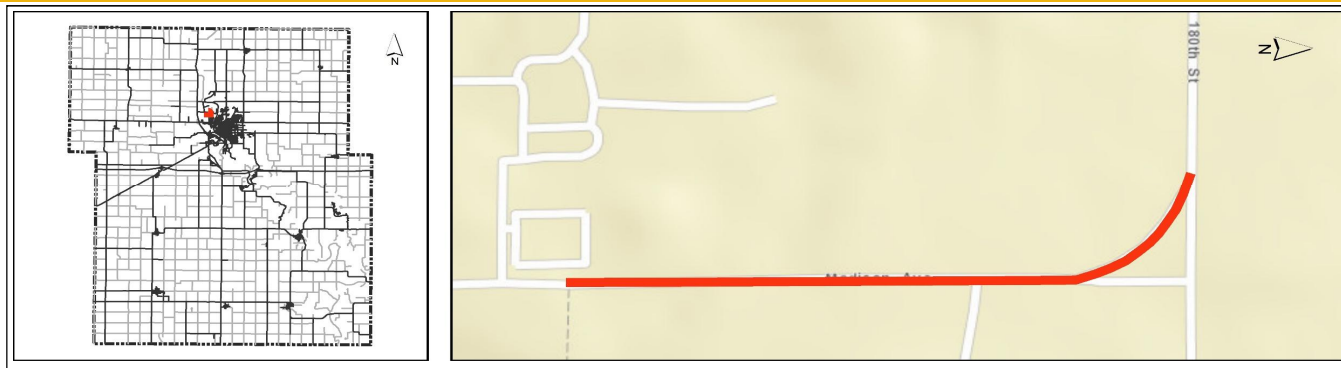
SEGMENT

Location Description

Road: MADISON AVE
 From: 1010 ft N of 6TH AVE NW
 To: 180TH ST
 Length (miles): 0.54

GPS ID: 2895

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	824	5
Pavement Shoulder Width (ft)	24' 3'	0
Average Roadside Risk	1.05	0
Access Points per Mile	3.7	1
High Risk Curve Density/Mile	1.9	2
Avg. Pavement Condition (IRI)	114	1
Lane Departure Crashes	2	2
Total Risk Factor Points (23 max)		11

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	3
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	1
Curves with Chevrons	1

Crash Data, 2007-2016	
Total Crashes	5
K and A Crashes	0
Lane Departure Crashes	2
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	310.0
K and A Crash Rate (per HMVMT)	0.0

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Assessment (RSA)	0	EA	\$ 30,000	\$ -
Conduct Access Control Analysis	0	EA	\$ 30,000	\$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,200	\$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.54	MILE	\$ 1,800	\$ 965
Install 4" Retroreflective Centerline	0.54	MILE	\$ 800	\$ 429
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	\$ 65,000	\$ -
Install Edgeline Rumble Strips (Both Sides of Road)	0.54	MILE	\$ 2,500	\$ 1,340
Install Centerline Rumble Strips	0.00	MILE	\$ 1,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	1	CURVE	\$ 2,500	\$ 2,500
Clear and Grub (15 ft Both Sides of Road)**	0.54	MILE	\$ 5,000	\$ 2,681
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 7,915

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Roadway Segment Improvements****Risk Factor Points: 11**

Project Name: MADISON AVE between 1010 ft N of 6TH AVE NW and 180TH ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID: 2895**

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	\$ 75,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Delineate Roadside Hazards (trees or utility poles) with Retroreflective Tape		EA	\$ 15	\$ -
Guardrail		MILE	\$ 50,000	\$ -
Post-Mounted Delineators		MILE	\$ 4,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed		CURVE	\$ 5,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		EA	\$ 2,000	\$ -
Remove/Relocate Objects in Hazardous Locations		EA	\$ 1,000	\$ -
Superelevation Correction on Curves		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 7,915
Subtotal:				\$ 7,915
Mobilization: (% +/-)*			10%	\$ 2,500
Traffic Control: (% +/-)			5%	\$ 517
Contingency: (% +/-)			20%	\$ 2,068
Estimated Project Cost				\$ 13,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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End of Project Description

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Local Road Safety Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: 11



Project Name: QUAIL AVE between DIVISION and MIDWAY BLVD
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

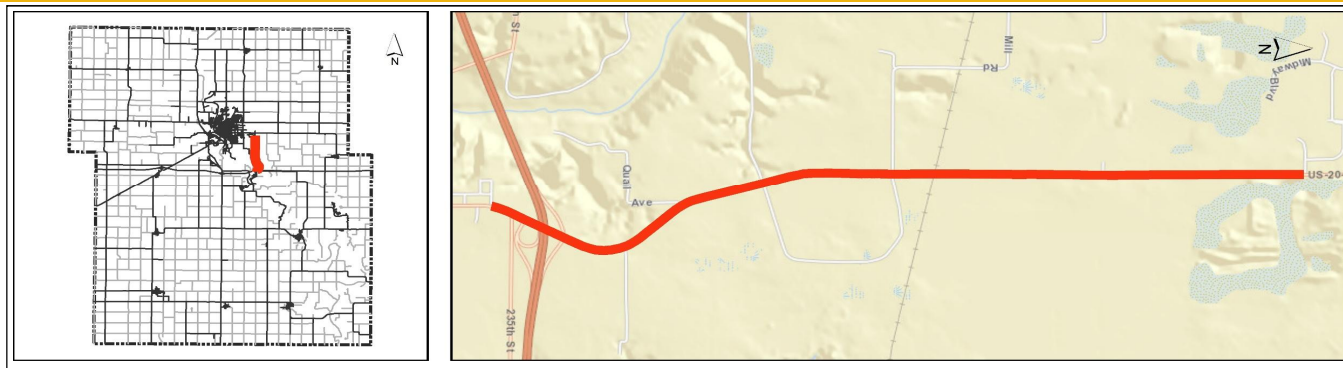
SEGMENT

Location Description

Road: QUAIL AVE
From: DIVISION
To: MIDWAY BLVD
Length (miles): 3.59

GPS ID: 2914

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	6,392	6
Pavement Shoulder Width (ft)	22' 10'	0
Average Roadside Risk	1.06	0
Access Points per Mile	7.5	2
High Risk Curve Density/Mile	0.8	1
Avg. Pavement Condition (IRI)	87	0
Lane Departure Crashes	8	2
Total Risk Factor Points (23 max)		11

Other Information	
Paved Shoulder	Yes
Shoulder Width (ft)	10
Speed Limit (mph)	55
Lane Width (ft)	11
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	Yes
Curves (L>100', R≤1,000')	3
Curves with Chevrons	0

Crash Data, 2007-2016	
Total Crashes	115
K and A Crashes	4
Lane Departure Crashes	8
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	137.3
K and A Crash Rate (per HMVMT)	4.8

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Assessment (RSA)	0	EA	\$ 30,000	\$ -
Conduct Access Control Analysis	0	EA	\$ 30,000	\$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	3.59	MILE	\$ 1,200	\$ 4,305
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,800	\$ -
Install 4" Retroreflective Centerline	3.59	MILE	\$ 800	\$ 2,870
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	\$ 65,000	\$ -
Install Edgeline Rumble Strips (Both Sides of Road)	3.59	MILE	\$ 2,500	\$ 8,969
Install Centerline Rumble Strips	0.00	MILE	\$ 1,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	3	CURVE	\$ 5,000	\$ 15,000
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 2,500	\$ -
Clear and Grub (15 ft Both Sides of Road)**	3.59	MILE	\$ 5,000	\$ 17,938
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 49,082

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Roadway Segment Improvements****Risk Factor Points: 11**

Project Name: QUAIL AVE between DIVISION and MIDWAY BLVD
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID: 2914**

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	\$ 75,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Delineate Roadside Hazards (trees or utility poles) with Retroreflective Tape		EA	\$ 15	\$ -
Guardrail		MILE	\$ 50,000	\$ -
Post-Mounted Delineators		MILE	\$ 4,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed		CURVE	\$ 5,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		EA	\$ 2,000	\$ -
Remove/Relocate Objects in Hazardous Locations		EA	\$ 1,000	\$ -
Superelevation Correction on Curves		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 49,082
Subtotal:				\$ 49,082
Mobilization: (% +/-)*			10%	\$ 4,910
Traffic Control: (% +/-)			5%	\$ 2,602
Contingency: (% +/-)			20%	\$ 10,406
Estimated Project Cost				\$ 67,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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Project Description Form Disclaimer:

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End of Project Description

Back Page

Local Road Safety Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: 11



Project Name: SAMSON AVE between LEHIGH CORPORATE LIMITS and 340 ft SW of 310TH ST
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
 Checked By: MMO

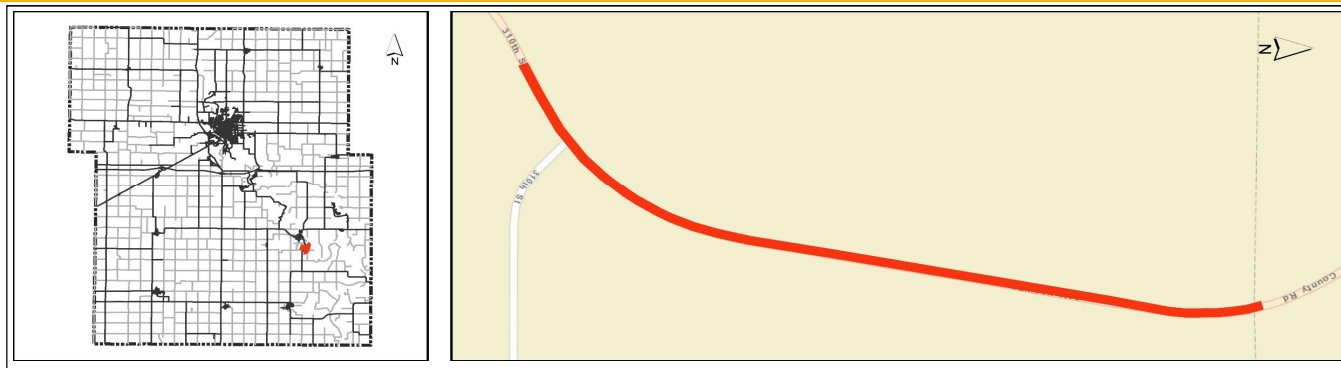
SEGMENT

Location Description

Road: SAMSON AVE
 From: LEHIGH CORPORATE LIMITS
 To: 340 ft SW of 310TH ST
 Length (miles): 0.56

GPS ID: 2921

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	630	4
Pavement Shoulder Width (ft)	22' 6'	0
Average Roadside Risk	0.88	0
Access Points per Mile	5.4	2
High Risk Curve Density/Mile	3.6	2
Avg. Pavement Condition (IRI)	123	1
Lane Departure Crashes	1	2
Total Risk Factor Points (23 max)		11

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	6
Speed Limit (mph)	45
Lane Width (ft)	11
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	2
Curves with Chevrons	3

Crash Data, 2007-2016	
Total Crashes	8
K and A Crashes	2
Lane Departure Crashes	1
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	625.8
K and A Crash Rate (per HMVMT)	156.5

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Assessment (RSA)	1	EA	\$ 30,000	\$ 30,000
Conduct Access Control Analysis	0	EA	\$ 30,000	\$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.56	MILE	\$ 1,200	\$ 667
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,800	\$ -
Install 4" Retroreflective Centerline	0.56	MILE	\$ 800	\$ 445
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	\$ 65,000	\$ -
Install Edgeline Rumble Strips (Both Sides of Road)	0.56	MILE	\$ 2,500	\$ 1,389
Install Centerline Rumble Strips	0.00	MILE	\$ 1,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	3	CURVE	\$ 2,500	\$ 7,500
Clear and Grub (15 ft Both Sides of Road)**	0.56	MILE	\$ 5,000	\$ 2,779
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 42,780

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Roadway Segment Improvements****Risk Factor Points: 11****Project Name: SAMSON AVE between LEHIGH CORPORATE LIMITS and 340 ft SW of 310TH ST****Date: 9/22/17****Agency Name: Webster County****Contact Name: Will, Randy****E-mail: engineer@webstercountya.org****Prepared By: DJG/DVM****Checked By: MMO****SEGMENT****Opinion of Probable Cost (Additional Potential Improvements)****GPS ID: 2921**

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Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	\$ 75,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Delineate Roadside Hazards (trees or utility poles) with Retroreflective Tape		EA	\$ 15	\$ -
Guardrail		MILE	\$ 50,000	\$ -
Post-Mounted Delineators		MILE	\$ 4,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed		CURVE	\$ 5,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		EA	\$ 2,000	\$ -
Remove/Relocate Objects in Hazardous Locations		EA	\$ 1,000	\$ -
Superelevation Correction on Curves		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 42,780
Subtotal:				\$ 42,780
Mobilization: (% +/-)*			10%	\$ 4,280
Traffic Control: (% +/-)			5%	\$ 2,188
Contingency: (% +/-)			20%	\$ 8,752
Estimated Project Cost				\$ 58,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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End of Project Description

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Local Road Safety Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: 10



Project Name: D14 between 3960 ft W of PARAGON AVE and VINCENT AVE
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
 Checked By: MMO

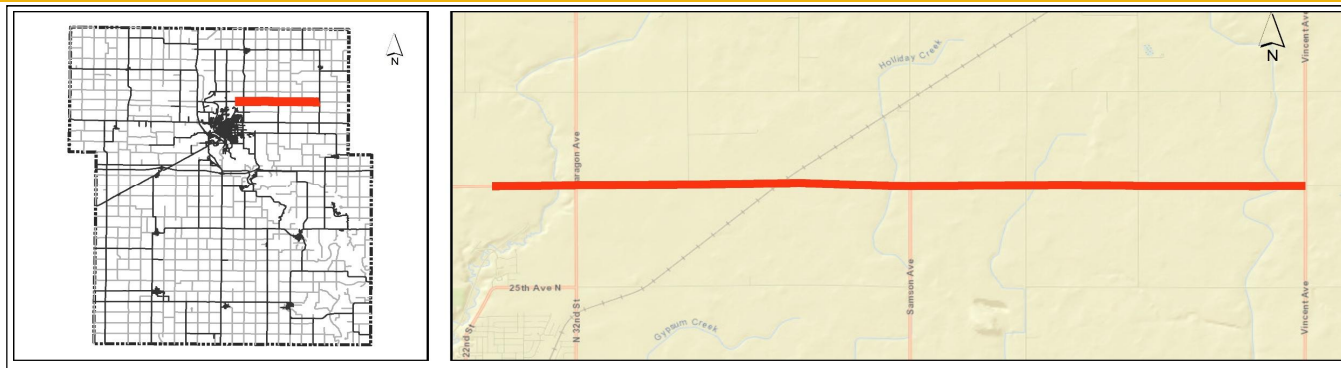
SEGMENT

Location Description

GPS ID: 2798

Road: D14
 From: 3960 ft W of PARAGON AVE
 To: VINCENT AVE
 Length (miles): 7.30

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	929	5
Pavement Shoulder Width (ft)	23' 4'	0
Average Roadside Risk	1.20	0
Access Points per Mile	6.2	2
High Risk Curve Density/Mile	0.0	0
Avg. Pavement Condition (IRI)	110	1
Lane Departure Crashes	4	2
Total Risk Factor Points (23 max)		10

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	4
Speed Limit (mph)	55
Lane Width (ft)	11.5
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	0
Curves with Chevrons	0

Crash Data, 2007-2016	
Total Crashes	42
K and A Crashes	6
Lane Departure Crashes	4
Lane Departure K and A Crashes	2
Total Crash Rate (per HMVMT)	169.7
K and A Crash Rate (per HMVMT)	24.2

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Assessment (RSA)	0	EA	\$ 30,000	\$ -
Conduct Access Control Analysis	0	EA	\$ 30,000	\$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	7.30	MILE	\$ 1,200	\$ 8,762
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,800	\$ -
Install 4" Retroreflective Centerline	7.30	MILE	\$ 800	\$ 5,841
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	\$ 65,000	\$ -
Install Edgeline Rumble Strips (Both Sides of Road)	7.30	MILE	\$ 2,500	\$ 18,253
Install Centerline Rumble Strips	0.00	MILE	\$ 1,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 2,500	\$ -
Clear and Grub (15 ft Both Sides of Road)**	7.30	MILE	\$ 5,000	\$ 36,506
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 69,362

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Roadway Segment Improvements****Risk Factor Points: 10**

Project Name: D14 between 3960 ft W of PARAGON AVE and VINCENT AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID: 2798**

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Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	\$ 75,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Delineate Roadside Hazards (trees or utility poles) with Retroreflective Tape		EA	\$ 15	\$ -
Guardrail		MILE	\$ 50,000	\$ -
Post-Mounted Delineators		MILE	\$ 4,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed		CURVE	\$ 5,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		EA	\$ 2,000	\$ -
Remove/Relocate Objects in Hazardous Locations		EA	\$ 1,000	\$ -
Superelevation Correction on Curves		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Provide Turn Lanes at Intersections	3	INT	\$ 150,000	\$ 450,000
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ 450,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 69,362
Subtotal:				\$ 519,362
Mobilization: (% +/-)* 10%				\$ 51,940
Traffic Control: (% +/-) 5%				\$ 26,140
Contingency: (% +/-) 20%				\$ 104,558
Estimated Project Cost				\$ 702,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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End of Project Description

Back Page

Local Road Safety Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: 10



Project Name: 200TH ST between 2620 ft W of RACINE AVE and XAVIER AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT

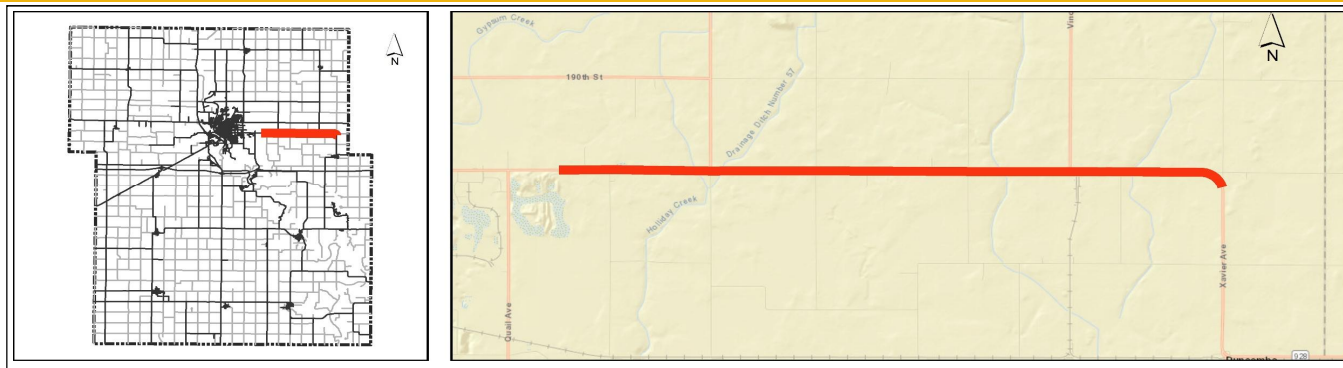
Location Description

GPS ID: 2802

Road: 200TH ST
From: 2620 ft W of RACINE AVE
To: XAVIER AVE
Length (miles): 6.60

This segment contains the following high scoring curve: GPS ID 18506

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	2,737	6
Pavement Shoulder Width (ft)	24' 5'	0
Average Roadside Risk	1.42	0
Access Points per Mile	5.6	2
High Risk Curve Density/Mile	0.0	0
Avg. Pavement Condition (IRI)	93	0
Lane Departure Crashes	5	2
Total Risk Factor Points (23 max)		10

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	5
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	0
Curves with Chevrons	1

Crash Data, 2007-2016	
Total Crashes	72
K and A Crashes	4
Lane Departure Crashes	5
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	109.1
K and A Crash Rate (per HMVMT)	6.1

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Assessment (RSA)	0	EA	\$ 30,000	\$ -
Conduct Access Control Analysis	0	EA	\$ 30,000	\$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,200	\$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	6.60	MILE	\$ 1,800	\$ 11,886
Install 4" Retroreflective Centerline	6.60	MILE	\$ 800	\$ 5,283
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	6.60	MILE	\$ 65,000	\$ 429,212
Install Edgeline Rumble Strips (Both Sides of Road)	6.60	MILE	\$ 2,500	\$ 16,508
Install Centerline Rumble Strips	6.60	MILE	\$ 1,000	\$ 6,603
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	1	CURVE	\$ 2,500	\$ 2,500
Clear and Grub (15 ft Both Sides of Road)**	6.60	MILE	\$ 5,000	\$ 33,016
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 505,008

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Roadway Segment Improvements****Risk Factor Points: 10**

Project Name: 200TH ST between 2620 ft W of RACINE AVE and XAVIER AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID: 2802**

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Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	\$ 75,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Delineate Roadside Hazards (trees or utility poles) with Retroreflective Tape		EA	\$ 15	\$ -
Guardrail		MILE	\$ 50,000	\$ -
Post-Mounted Delineators		MILE	\$ 4,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed		CURVE	\$ 5,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		EA	\$ 2,000	\$ -
Remove/Relocate Objects in Hazardous Locations		EA	\$ 1,000	\$ -
Superelevation Correction on Curves		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 505,008
Subtotal:				\$ 505,008
Mobilization: (% +/-)* 10%				\$ 50,510
Traffic Control: (% +/-) 5%				\$ 25,296
Contingency: (% +/-) 20%				\$ 101,186
Estimated Project Cost				\$ 682,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

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End of Project Description**Back Page**

Local Road Safety Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: **10**



Project Name: P6D between SWALLOW AVE and QUAIL AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

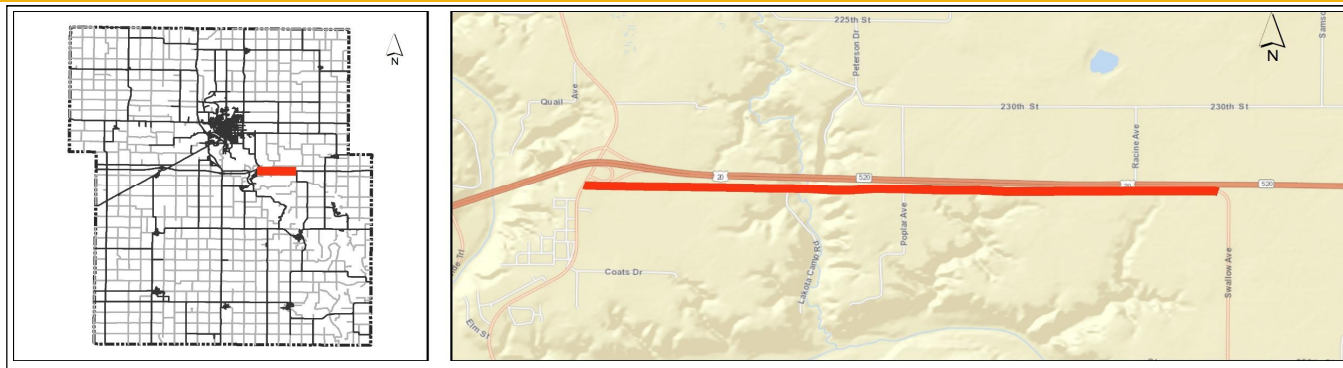
SEGMENT

Location Description

Road: P6D
From: SWALLOW AVE
To: QUAIL AVE
Length (miles): 3.38

GPS ID: 2811

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	560	3
Pavement Shoulder Width (ft)	22' 6'	0
Average Roadside Risk	1.08	0
Access Points per Mile	7.1	3
High Risk Curve Density/Mile	0.3	1
Avg. Pavement Condition (IRI)	148	1
Lane Departure Crashes	1	2
Total Risk Factor Points (23 max)		10

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	6
Speed Limit (mph)	55
Lane Width (ft)	11
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	1
Curves with Chevrons	1

Crash Data, 2007-2016	
Total Crashes	18
K and A Crashes	0
Lane Departure Crashes	1
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	260.3
K and A Crash Rate (per HMVMT)	0.0

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Assessment (RSA)	0	EA	\$ 30,000	\$ -
Conduct Access Control Analysis	0	EA	\$ 30,000	\$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	3.38	MILE	\$ 1,200	\$ 4,059
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,800	\$ -
Install 4" Retroreflective Centerline	3.38	MILE	\$ 800	\$ 2,706
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	\$ 65,000	\$ -
Install Edgeline Rumble Strips (Both Sides of Road)	3.38	MILE	\$ 2,500	\$ 8,455
Install Centerline Rumble Strips	0.00	MILE	\$ 1,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	1	CURVE	\$ 2,500	\$ 2,500
Clear and Grub (15 ft Both Sides of Road)**	3.38	MILE	\$ 5,000	\$ 16,910
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 34,630

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Roadway Segment Improvements****Risk Factor Points: 10**

Project Name: P6D between SWALLOW AVE and QUAIL AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID: 2811**

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	\$ 75,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Delineate Roadside Hazards (trees or utility poles) with Retroreflective Tape		EA	\$ 15	\$ -
Guardrail		MILE	\$ 50,000	\$ -
Post-Mounted Delineators		MILE	\$ 4,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed		CURVE	\$ 5,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		EA	\$ 2,000	\$ -
Remove/Relocate Objects in Hazardous Locations		EA	\$ 1,000	\$ -
Superelevation Correction on Curves		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.30	MILE	\$ 65,000	\$ 19,500
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ 19,500
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 34,630
Subtotal:				\$ 54,130
Mobilization: (% +/-)*			10%	\$ 5,420
Traffic Control: (% +/-)			5%	\$ 2,890
Contingency: (% +/-)			20%	\$ 11,560
Estimated Project Cost				\$ 74,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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End of Project Description

Back Page

Local Road Safety Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: 10



Project Name: D33 between LAINSON AVE and MINING BLVD
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

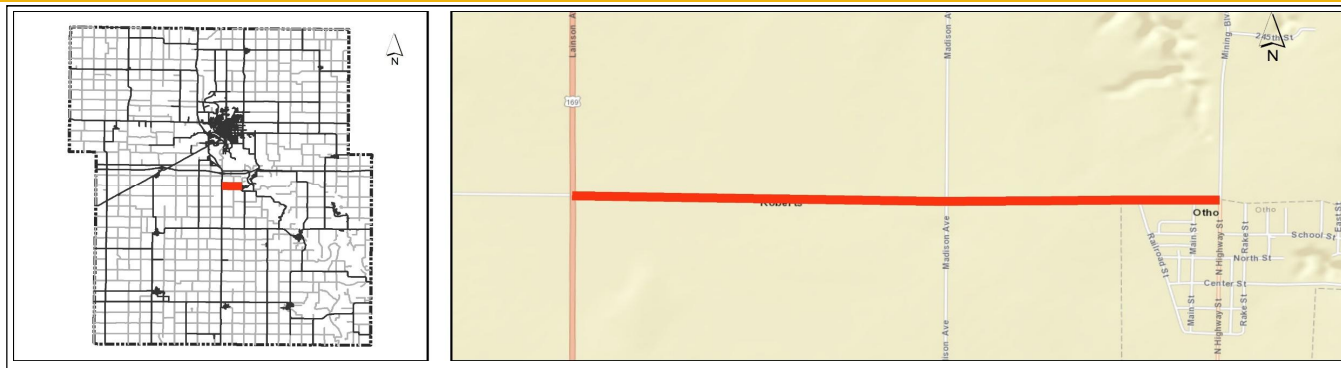
SEGMENT

Location Description

GPS ID: 2812

Road: D33
From: LAINSON AVE
To: MINING BLVD
Length (miles): 1.72

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	790	4
Pavement Shoulder Width (ft)	22' 8'	0
Average Roadside Risk	1.11	0
Access Points per Mile	11.6	3
High Risk Curve Density/Mile	0.0	0
Avg. Pavement Condition (IRI)	122	1
Lane Departure Crashes	1	2
Total Risk Factor Points (23 max)		10

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	8
Speed Limit (mph)	55
Lane Width (ft)	11
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	0
Curves with Chevrons	0

Crash Data, 2007-2016	
Total Crashes	8
K and A Crashes	1
Lane Departure Crashes	1
Lane Departure K and A Crashes	1
Total Crash Rate (per HMVMT)	160.8
K and A Crash Rate (per HMVMT)	20.1

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Assessment (RSA)	0	EA	\$ 30,000	\$ -
Conduct Access Control Analysis	0	EA	\$ 30,000	\$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	1.72	MILE	\$ 1,200	\$ 2,070
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,800	\$ -
Install 4" Retroreflective Centerline	1.72	MILE	\$ 800	\$ 1,380
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	\$ 65,000	\$ -
Install Edgeline Rumble Strips (Both Sides of Road)	1.72	MILE	\$ 2,500	\$ 4,312
Install Centerline Rumble Strips	0.00	MILE	\$ 1,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 2,500	\$ -
Clear and Grub (15 ft Both Sides of Road)**	1.72	MILE	\$ 5,000	\$ 8,624
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 16,386

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Roadway Segment Improvements****Risk Factor Points: 10**

Project Name: D33 between LAINSON AVE and MINING BLVD
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID: 2812**

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Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	\$ 75,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Delineate Roadside Hazards (trees or utility poles) with Retroreflective Tape		EA	\$ 15	\$ -
Guardrail		MILE	\$ 50,000	\$ -
Post-Mounted Delineators		MILE	\$ 4,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed		CURVE	\$ 5,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		EA	\$ 2,000	\$ -
Remove/Relocate Objects in Hazardous Locations		EA	\$ 1,000	\$ -
Superelevation Correction on Curves		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 16,386
Subtotal:				\$ 16,386
Mobilization: (% +/-)*			10%	\$ 2,500
Traffic Control: (% +/-)			5%	\$ 823
Contingency: (% +/-)			20%	\$ 3,291
Estimated Project Cost				\$ 23,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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End of Project Description

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Local Road Safety Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: 10



Project Name: P29 between 5260 ft S of 390TH ST and 980 ft N of DAKOTA AVE/220TH ST
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
 Checked By: MMO

SEGMENT

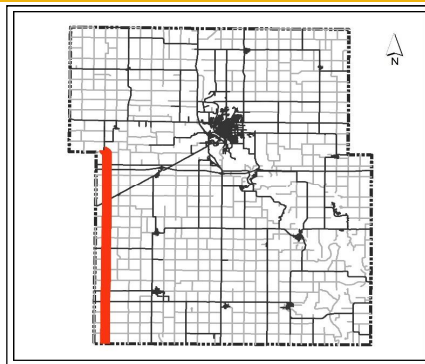
Location Description

GPS ID: 2826

Road: P29
 From: 5260 ft S of 390TH ST
 To: 980 ft N of DAKOTA AVE/220TH ST
 Length (miles): 18.52

This segment contains the following high scoring intersection: GPS ID 562967

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	928	5
Pavement Shoulder Width (ft)	22' 6'	0
Average Roadside Risk	1.07	0
Access Points per Mile	3.3	1
High Risk Curve Density/Mile	0.1	1
Avg. Pavement Condition (IRI)	97	1
Lane Departure Crashes	11	2
Total Risk Factor Points (23 max)		10

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	6
Speed Limit (mph)	55
Lane Width (ft)	11
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	2
Curves with Chevrons	2

Crash Data, 2007-2016	
Total Crashes	65
K and A Crashes	2
Lane Departure Crashes	11
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	103.6
K and A Crash Rate (per HMVMT)	3.2

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Assessment (RSA)	0	EA	\$ 30,000	\$ -
Conduct Access Control Analysis	0	EA	\$ 30,000	\$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	18.52	MILE	\$ 1,200	\$ 22,224
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,800	\$ -
Install 4" Retroreflective Centerline	18.52	MILE	\$ 800	\$ 14,816
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	\$ 65,000	\$ -
Install Edgeline Rumble Strips (Both Sides of Road)	18.52	MILE	\$ 2,500	\$ 46,300
Install Centerline Rumble Strips	0.00	MILE	\$ 1,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	2	CURVE	\$ 2,500	\$ 5,000
Clear and Grub (15 ft Both Sides of Road)**	18.52	MILE	\$ 5,000	\$ 92,600
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 180,940

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Roadway Segment Improvements****Risk Factor Points: 10****Project Name:** P29 between 5260 ft S of 390TH ST and 980 ft N of DAKOTA AVE/220TH ST**Date:** 9/22/17**Agency Name:** Webster County**Contact Name:** Will, Randy**E-mail:** engineer@webstercountya.org**Prepared By:** DJG/DVM**Checked By:** MMO**SEGMENT****Opinion of Probable Cost (Additional Potential Improvements)****GPS ID: 2826**

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Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	\$ 75,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Delineate Roadside Hazards (trees or utility poles) with Retroreflective Tape		EA	\$ 15	\$ -
Guardrail		MILE	\$ 50,000	\$ -
Post-Mounted Delineators		MILE	\$ 4,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed		CURVE	\$ 5,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		EA	\$ 2,000	\$ -
Remove/Relocate Objects in Hazardous Locations		EA	\$ 1,000	\$ -
Superelevation Correction on Curves		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 180,940
Subtotal:				\$ 180,940
Mobilization: (% +/-)*			10%	\$ 18,100
Traffic Control: (% +/-)			5%	\$ 9,192
Contingency: (% +/-)			20%	\$ 36,768
Estimated Project Cost				\$ 245,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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End of Project Description**Back Page**

Local Road Safety Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: 10



Project Name: HWY 50 between RACINE AVE and 520 ft SE of SCHOOL ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT

Location Description

GPS ID: 2887

Road: HWY 50
From: RACINE AVE
To: 520 ft SE of SCHOOL ST
Length (miles): 0.77

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	727	4
Pavement Shoulder Width (ft)	22' 8'	0
Average Roadside Risk	0.45	0
Access Points per Mile	11.6	3
High Risk Curve Density/Mile	0.0	0
Avg. Pavement Condition (IRI)	109	1
Lane Departure Crashes	1	2
Total Risk Factor Points (23 max)		10

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	8
Speed Limit (mph)	45
Lane Width (ft)	11
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Curves (L>100', R≤1,000')	0
Curves with Chevrons	0

Crash Data, 2007-2016	
Total Crashes	7
K and A Crashes	0
Lane Departure Crashes	1
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	341.4
K and A Crash Rate (per HMVMT)	0.0

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Assessment (RSA)	0	EA	\$ 30,000	\$ -
Conduct Access Control Analysis	0	EA	\$ 30,000	\$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.77	MILE	\$ 1,200	\$ 927
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,800	\$ -
Install 4" Retroreflective Centerline	0.77	MILE	\$ 800	\$ 618
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	\$ 65,000	\$ -
Install Edgeline Rumble Strips (Both Sides of Road)	0.77	MILE	\$ 2,500	\$ 1,931
Install Centerline Rumble Strips	0.00	MILE	\$ 1,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 2,500	\$ -
Clear and Grub (15 ft Both Sides of Road)**	0.77	MILE	\$ 5,000	\$ 3,863
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 7,339

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Roadway Segment Improvements****Risk Factor Points: 10**

Project Name: HWY 50 between RACINE AVE and 520 ft SE of SCHOOL ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID: 2887**

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Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	\$ 75,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Delineate Roadside Hazards (trees or utility poles) with Retroreflective Tape		EA	\$ 15	\$ -
Guardrail		MILE	\$ 50,000	\$ -
Post-Mounted Delineators		MILE	\$ 4,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed		CURVE	\$ 5,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		EA	\$ 2,000	\$ -
Remove/Relocate Objects in Hazardous Locations		EA	\$ 1,000	\$ -
Superelevation Correction on Curves		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 7,339
Subtotal:				\$ 7,339
Mobilization: (% +/-)*			10%	\$ 2,500
Traffic Control: (% +/-)			5%	\$ 432
Contingency: (% +/-)			20%	\$ 1,729
Estimated Project Cost				\$ 12,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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End of Project Description

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Local Road Safety Plan

Project Description for Roadway Segment Improvements

Risk Factor Points: 10



Project Name: PARAGON AVE between 2660 ft N of 25TH AVE N and 130TH ST
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
 Checked By: MMO

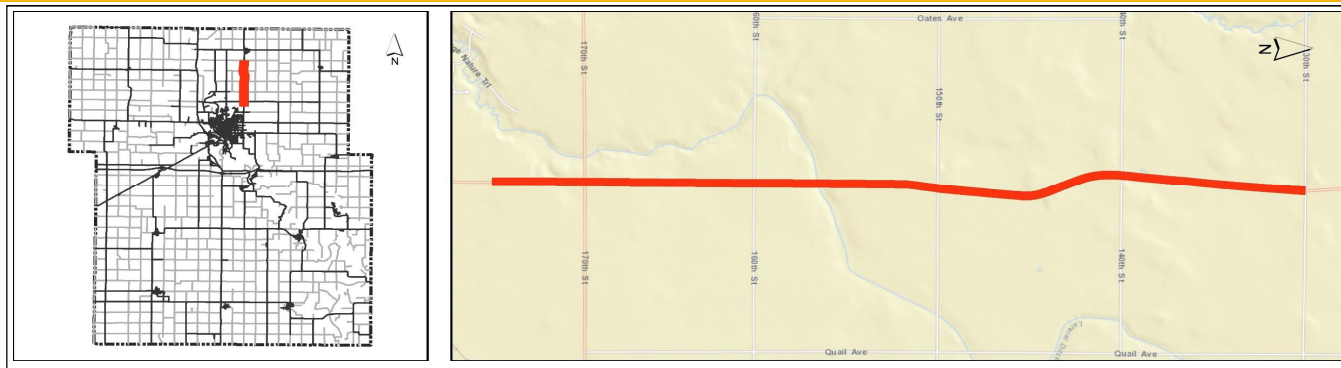
SEGMENT

Location Description

Road: PARAGON AVE
 From: 2660 ft N of 25TH AVE N
 To: 130TH ST
 Length (miles): 4.45

GPS ID: 2909

Project Location Maps



Segment Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	2,391	6
Pavement Shoulder Width (ft)	24' 6'	0
Average Roadside Risk	0.70	0
Access Points per Mile	5.4	2
High Risk Curve Density/Mile	0.0	0
Avg. Pavement Condition (IRI)	91	0
Lane Departure Crashes	3	2
Total Risk Factor Points (23 max)		10

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	6
Speed Limit (mph)	50
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	Yes
Curves (L>100', R≤1,000')	0
Curves with Chevrons	4

Crash Data, 2007-2016	
Total Crashes	44
K and A Crashes	3
Lane Departure Crashes	3
Lane Departure K and A Crashes	1
Total Crash Rate (per HMVMT)	113.3
K and A Crash Rate (per HMVMT)	7.7

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Conduct Road Safety Assessment (RSA)	0	EA	\$ 30,000	\$ -
Conduct Access Control Analysis	0	EA	\$ 30,000	\$ -
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,200	\$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	4.45	MILE	\$ 1,800	\$ 8,009
Install 4" Retroreflective Centerline	4.45	MILE	\$ 800	\$ 3,559
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	4.45	MILE	\$ 65,000	\$ 289,205
Install Edgeline Rumble Strips (Both Sides of Road)	4.45	MILE	\$ 2,500	\$ 11,123
Install Centerline Rumble Strips	0.00	MILE	\$ 1,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	4	CURVE	\$ 2,500	\$ 10,000
Clear and Grub (15 ft Both Sides of Road)**	4.45	MILE	\$ 5,000	\$ 22,247
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 344,143

Continued on back of this page.

** Unit price varies based on average roadside risk score.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Roadway Segment Improvements****Risk Factor Points: 10**

Project Name: PARAGON AVE between 2660 ft N of 25TH AVE N and 130TH ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/22/17

Prepared By: DJG/DVM
Checked By: MMO

SEGMENT**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID: 2909**

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Flatten and Widen Foreslopes (both sides of road)		MILE	\$ 75,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Delineate Roadside Hazards (trees or utility poles) with Retroreflective Tape		EA	\$ 15	\$ -
Guardrail		MILE	\$ 50,000	\$ -
Post-Mounted Delineators		MILE	\$ 4,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed		CURVE	\$ 5,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		EA	\$ 2,000	\$ -
Remove/Relocate Objects in Hazardous Locations		EA	\$ 1,000	\$ -
Superelevation Correction on Curves		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 344,143
Subtotal:				\$ 344,143
Mobilization: (% +/-)*			10%	\$ 34,420
Traffic Control: (% +/-)			5%	\$ 17,287
Contingency: (% +/-)			20%	\$ 69,150
Estimated Project Cost				\$ 465,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only Kimley-Horn's judgment as a design professional familiar with the construction industry. Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:

The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. No formal assessment was made for the improvement recommendations contained on this page, if in question, it is recommended that a study/analysis of this location be made to warrant the above indicated improvements. This project description form is based on our knowledge as of September 2017.

End of Project Description

Back Page

APPENDIX B3
SEGMENT RISK FACTOR RANKING RESULTS



GPS ID	Paved Road	Beginning of Segment	End of Segment	Length (mi)	Risk Factor Points	Average Daily Traffic (Value)	Average Daily Traffic (Points)	Pavement Width (ft) (Value)	Shoulder Width (ft) (Value)	Pavement and Shoulder Width (ft) (Points)	Pavement Condition (Value)	Pavement Condition Risk	Roadside Rating (Value)	Roadside Rating (Points)	Number of Driveways/ Intersections per Mile (Value)	Number of Driveways/Inter sections per Mile (Points)	High Risk Curve Density per Mile (Value)	High Risk Curve Density per Mile (Points)	Lane Departure Crashes (Value)	Lane Departure Crashes (Points)	Total Crashes	K and A	Paved Shoulder	Lane Width	Speed Limit	Number of Lanes	Edgeline Rumble Strips
2865	DOLLIVER PARK AVE	QUAIL AVE	200 ft NE of DOLLIVER MEMORIAL	0.79	15	280	1	24	1	2	162	1	4.57	4	6.4	3	2.5	2	1	2	7	0	No	12	55	2	No
2870	DOLLIVER PARK AVE	286TH ST	DOLLIVER MEMORIAL	1.82	14	280	2	20	1	4	175	2	2.81	2	6.1	0	3.3	2	2	2	8	2	No	10	20	2	No
2790	120TH ST	1280 ft W of US 169	2610 ft E of OATES AVE	3.74	13	1,856	6	24	10	0	144	1	1.63	2	5.9	2	0.0	0	5	2	49	2	No	12	55	2	No
2797	D14	US 169	2000 ft E of NELSON AVE	2.90	13	2,602	6	24	6	0	90	0	1.56	2	8.3	3	0.0	0	5	2	77	6	Yes	12	55	2	No
2899	NELSON AVE	590 ft N of 31ST AVE N	120TH ST	5.34	12	2,697	6	24	4	0	124	1	1.02	0	9.4	3	0.0	0	3	2	73	4	No	12	55	2	No
2900	NELSON AVE	DIVISION	HILLTOP DR	1.70	12	1,805	6	22	10	0	131	1	1.56	2	32.3	2	1.2	1	0	0	22	0	No	11	30	2	No
2866	MILL RD	PARAGON AVE	220TH ST	0.95	11	1,730	6	22	3	0	119	1	2.20	2	2.1	0	0.0	0	5	2	28	3	No	11	40	2	No
2895	MADISON AVE	1010 ft N of 6TH AVE NW	180TH ST	0.54	11	824	5	24	3	0	114	1	1.05	0	3.7	1	1.9	2	2	2	5	0	No	12	55	2	No
2914	QUAIL AVE	DIVISION	MIDWAY BLVD	3.59	11	6,392	6	22	10	0	87	0	1.06	0	7.5	2	0.8	1	8	2	115	4	Yes	11	55	2	No
2921	SAMSON AVE	LEHIGH CORPORATE LIMITS	340 ft SW of 310TH ST	0.56	11	630	4	22	6	0	123	1	0.88	0	5.4	2	3.6	2	1	2	8	2	No	11	45	2	No
2796	160TH ST	ORCHARD RD	END OF ROAD	0.56	10	190	1	22	1	2	199	2	0.10	0	59.0	3	0.0	0	1	2	3	1	No	11	25	2	No
2798	D14	3960 ft W of PARAGON AVE	VINCENT AVE	7.30	10	929	5	23	4	0	110	1	1.20	0	6.2	2	0.0	0	4	2	42	6	No	11.5	55	2	No
2802	200TH ST	2620 ft W of RACINE AVE	XAVIER AVE	6.60	10	2,737	6	24	5	0	93	0	1.42	0	5.6	2	0.0	0	5	2	72	4	No	12	55	2	No
2811	P6D	SWALLOW AVE	QUAIL AVE	3.38	10	560	3	22	6	0	148	1	1.08	0	7.1	3	0.3	1	1	2	18	0	No	11	55	2	No
2812	D33	LAINSON AVE	MINING BLVD	1.72	10	790	4	22	8	0	122	1	1.11	0	11.6	3	0.0	0	1	2	8	1	No	11	55	2	No
2826	P29	5260 ft S of 390TH ST	980 ft N of DAKOTA AVE/220TH ST	18.52	10	928	5	22	6	0	97	1	1.07	0	3.3	1	0.1	1	11	2	65	2	No	11	55	2	No
2864	HAYES AVE	190TH ST	2850 ft S of 190TH ST	0.54	10	900	5	26	1	2	83	0	1.05	0	7.4	3	0.0	0	0	0	4	0	No	13	55	2	No
2887	HWY 50	RACINE AVE	520 ft SE of SCHOOL ST	0.77	10	727	4	22	8	0	109	1	0.45	0	11.6	3	0.0	0	1	2	7	0	No	11	45	2	No
2909	PARAGON AVE	2660 ft N of 25TH AVE N	130TH ST	4.45	10	2,391	6	24	6	0	91	0	0.70	0	5.4	2	0.0	0	3	2	44	3	No	12	50	2	No
2801	190TH ST	2600 ft E of PARAGON AVE	HAMILTON-WEBSTER COUNTY LINE	8.55	9	1,055	5	22	6	0	63	0	1.02	0	4.4	2	0.0	0	2	2	42	6	No	11	55	2	No
2805	225TH ST	JOHNSON AVE	OLD HWY 169	0.98	9	247	1	22	6	0	146	1	0.69	0	15.4	3	4.1	2	1	2	4	0	No	11	45	2	No
2817	290TH ST	SAMSON AVE	HAMILTON-WEBSTER COUNTY LINE	5.89	9	427	2	22	5	0	93	0	1.52	2	4.8	2	0.3	1	2	2	20	3	No	11	55	2	No
2819	295TH ST	GARFIELD AVE	CALLENDER CORPORATE LIMITS	0.57	9	690	4	23	6	0	100	1	0.57	0	21.2	3	1.8	1	0	0	4	1	No	11.5	55	2	No
2878	FAIRBANKS AVE	190TH ST	950 ft S of DONAHUE ST	4.78	9	560	3	22	6	0	80	0	0.93	0	7.5	3	0.4	1	1	2	15	0	No	11	55	2	No
2894	MADISON AVE	170TH ST	180TH ST	1.00	9	613	3	24	4	0	106	1	1.47	0	18.0	3	0.0	0	3	2	11	1	No	12	55	2	No
2905	OLD HWY 20	US 169	2200 ft SW of US 169	0.79	9	4,550	6	24	10	0	127	1	0.42	0	5.1	2	0.0	0	0	0	10	0	No	12	45	2	No
2907	OLD US 20	710 ft E of ADAMS AVE	300 ft SW of 234TH ST	6.54	9	1,695	6	24	8	0	110	1	0.75	0	2.1	0	0.0	0	5	2	63	4	No	12	55	2	No
2913	PARKER DR	JOHNSON AVE	1900 ft W of 2ND AVE S	2.46	9	407	2	22	3	0	119	1	0.83	0	42.3	3	0.8	1	1	2	17	0	No	11	45	2	No
2923	SAMSON AVE	310TH ST	330TH ST	1.96	9	630	4	22	6	0	96	1	1.05	0	3.6	1	1.0	1	2	2	5	0	No	11	55	2	No
2926	SWALLOW AVE	235TH ST	250TH ST	1.02	9	560	3	22	3	0	197	2	1.05	0	8.9	3	1.0	1	0	0	4	0	No	11	55	2	No
2938	XAVIER AVE	200TH ST	220TH ST	1.86	9	2,088	6	24	5	0	91	0	0.75	0	5.4	2	1.1	1	0	0	16	2	No	12	55	2	No
2483	210TH ST	EASTER AVE	DAKOTA AVE	0.75	8	180	1	22	5	0	129	1	1.60	2	5.3	2	0.0	0	1	2	1	0	No	11	55	2	No
2490	220TH ST	XAVIER AVE	HAMILTON-WEBSTER COUNTY LINE	0.92	8	2,160	6	24	7	0	95	1	1.05	0	2.2	0	1.1	1	0	0	4	0	No	12	55	2	No
2791	120TH ST	VINCENT AVE	1300 ft W of QUAIL AVE	5.78	8	761	4	22	6	0	138	1	1.07	0	4.2	1	0.0	0	2	2	13	3	No	11	55	2	No
2814	255TH ST	NELSON AVE	OAK AVE	1.03	8	795	4	22	8	0	127	1	1.05	0	4.9	2	1.0	1	0	0	6	1	No	11	55	2	No
2815	260TH ST	OAK AVE	QUAIL AVE	2.33	8	298	2	24	2	0	96	1	1.97	2	4.3	1	2.1	2	0	0	3	1	No	12	55	2	No
2861	PARAGON AVE AND CO P59	130TH ST	950 ft S of 1ST ST SW	0.50	8	2,160	6	24	6	0	74	0	0.91	0	6.0	2	0.0	0	0	0	1	0	No	12	55	2	No
2867	CO RTE D43	PARAGON AVE	290TH ST	1.46	8	565	3	22	10	0	86	0	0.99	0	6.2	2	0.7	1	2	2	12	0	No	11	55	2	No
2876	FAIRBANKS AVE	280TH ST	2100 ft S of WESTERN ST	3.51	8	950	5	22	7	0	53	0	1.21	0	3.4	1	0.0	0	2	2	11	0	No	11	55	2	No
2880	FAIRBANKS AVE	295TH ST	350TH ST	5.47	8	1,332	5	22	7	0	68	0	0.86	0	4.0	1	0.0	0	5	2	27	0	No	11	55	2	No
2882	FRONT ST	1900 ft E of CHURCH ST	1600 ft W of HIGH ST	0.99	8	639	3	24	3	0	110	1	0.40	0	51.5	2	0.0	0	1	2	5	0	No	12	25	2	No
2885	GYPSUM HOLLOW RD	15TH AVE S	END OF ROAD	1.92	8	1,131	5	24	6	0	153	1	0.65	0	6.2	0	3.1	2	0	0	14	2	No	12	35	2	No
2910	PARAGON AVE	CO RTE D43	360TH ST	6.97	8	780	4	22	6	0	99	1	1.20	0	5.7	2	0.1	1	0	0	24	0	No	11	55	2	No
2911	PARAGON AVE	1350 ft N of W CENTER AVE	HUMBOLDT-WEBSTER COUNTY LINE	1.75	8	840	5	22	6	0	74	0	1.39	0	3.4	1	0.0	0	1	2	10	3	No	11	55	2	No
2916	RACINE AVE	330TH ST	360TH ST	2.93	8	650	4	22	6	0	81	0	1.05	0	3.8	1	0.7	1	1	2	8	1	No	11	55	2	No
2932	UNION AVE	100TH ST	120TH ST	1.98	8	870	5	22	3	0	134	1	2.28	2	2.5	0	0.0	0	0	0	4	0	No	11	55	2	No
2933	VINCENT AVE	200TH ST	140TH ST	5.98	8	1,217	5	22	6	0	94	0	0.98	0	3.2	1	0.0	0	1	2	18	6	No	11	55	2	No
2795	160TH ST	ORCHARD RD	1200 ft W of OATES AVE	1.34	7	562	3	24	3	0	108	1	0.99	0	8.2	3	0.0	0	0	0	5	0	No	12	55	2	No
2800	180TH ST	US 169	MADISON AVE	0.92	7	509	2	24	4	0	109	1	1.11	0	30.5	3	1.1	1	0	0	12	0	No	12	55	2	No
2807	230TH ST	234TH ST	CALHOUN-WEBSTER COUNTY LINE	6.58	7	775	4	24	4	0	65	0	1.51	2	4.3	1	0.0	0	0	0	16	0	No	12	55	2	No
2863	MORTIMER ST	THOMAS ST	700 ft N of MARTIN ST	0.51	7	950	4	24	3	0	135	1	0.37	0	49.5	2	0.0	0	0	0	5	0	No	12	25	2	No
2874	EASTER AVE	200TH ST	210TH ST	1.00	7	180	1	22	5	0	123	1	1.87	2	4.0	1	0.0	0	1	2	1	0	No	11	55	2	No
2877	FAIRBANKS AVE	280TH ST	700 ft N of MARTIN ST	1.02	7	950	5	22	6	0	63	0	0.73	0	4.9	2	0.0	0	0	0	4	1	No	11	55	2	No
2884	GRANT AVE	230TH ST	400 ft S of 234TH ST	0.50	7	3,144	6	32	10	0	116	1	0.77	0	0.0	0	0.0	0	0	0	7	0	No	16	55	2	No
2898	NATIONAL AVE	120TH ST	160TH ST	4.01	7	311	2	24	4	0	66	0	1.01	0	24.9	3	0.0	0	1	2	20	1	No	12	55	2	No
2901	NELSON AVE	255TH ST	290TH ST	3.57	7	850	5	22	3	0	132	1	1.05	0	3.6	1	0.0	0	0	0	10	1	No	11	55	2	No
2917	RIVER WAY	WASHINGTON AVE	390TH	0.55	7	150	0	22	3	0	93	0	1.05	0	9.1	3	10.9	2	1	2	2	0	No	11	55	2	No
2918	RIVERSIDE TRL	NELSON AVE	1400 ft NE of MINING BLVD	1.13	7	247	1	24	5	0	206	2	1.18	0	8.9	3	1.8	1	0	0	0	0	No	12	55	2	No
2922	SAMSON AVE	250																									



GPS ID	Paved Road	Beginning of Segment	End of Segment	Length (mi)	Risk Factor Points	Average Daily Traffic (Value)	Average Daily Traffic (Points)	Pavement Width (ft) (Value)	Shoulder Width (ft) (Value)	Pavement and Shoulder Width (ft) (Points)	Pavement Condition (Value)	Pavement Condition Risk	Roadside Rating (Value)	Roadside Rating (Points)	Number of Driveways/ Intersections per Mile (Value)	Number of Driveways/Inter sections per Mile (Points)	High Risk Curve Density per Mile (Value)	High Risk Curve Density per Mile (Points)	Lane Departure Crashes (Value)	Lane Departure Crashes (Points)	Total Crashes	K and A	Paved Shoulder	Lane Width	Speed Limit	Number of Lanes	Edgeline Rumble Strips
2486	320TH ST	650 ft W of GARFIELD AVE	FAIRBANKS AVE	0.88	3	90	0	24	3	0	146	1	0.91	0	5.7	2	0.0	0	0	0	0	0	No	12	55	2	No
2820	310TH ST	FAIRBANKS AVE	CALHOUN-WEBSTER COUNTY LINE	4.95	3	235	1	22	6	0	89	0	1.05	0	3.6	0	0.0	0	1	2	5	1	No	11	55	2	No
2889	JOHNSON AVE	210TH ST	PARKER DR	0.65	3	120	0	22	3	0	100	1	1.05	0	4.6	2	0.0	0	0	0	0	0	No	11	55	2	No
2927	TAYLOR AVE	IOWA 175	100TH ST	2.50	3	600	3	22	10	0	82	0	1.05	0	1.6	0	0.0	0	0	0	4	0	No	11	55	2	No
2937	WASHINGTON AVE	IOWA 175	RIVER WAY	1.93	3	145	0	22	3	0	86	0	1.05	0	4.7	2	1.0	1	0	0	1	0	No	11	55	2	No
2787	100TH ST	DAKOTA AVE	FAIRBANKS AVE	1.93	2	45	0	22	4	0	209	2	0.84	0	2.1	0	0.0	0	0	0	0	0	No	11	55	2	No
2788	110TH ST	FAIRBANKS AVE	INDIANA AVE	3.07	2	140	0	22	6	0	152	1	1.01	0	3.6	0	1.0	1	0	0	0	0	No	11	55	2	No
2879	FAIRBANKS AVE	355TH ST	GREENE-WEBSTER COUNTY LINE	4.53	2	345	2	22	5	0	80	0	0.96	0	2.6	0	0.0	0	0	0	2	0	No	11	55	2	No
2881	FAIRBANKS AVE	100TH ST	CYCLONE ST	3.75	2	401	2	22	5	0	80	0	0.77	0	3.5	0	0.0	0	0	0	1	0	No	11	55	2	No
2924	SAMSON AVE	170TH ST	200TH ST	3.00	2	333	2	22	6	0	78	0	1.03	0	2.3	0	0.0	0	0	0	10	1	No	11	55	2	No
2804	210TH ST	HAYES AVE	JOHNSON AVE	1.98	1	120	0	22	3	0	102	1	1.05	0	3.0	0	0.0	0	0	0	0	0	No	11	55	2	No

APPENDIX C1

INTERSECTION SAFETY COUNTERMEASURES



This appendix summarizes the **intersection** safety countermeasures for consideration and provides detailed descriptions for each countermeasure from both the project selection decision tree as well as the additional potential improvements listed on the back side of the project sheets.

INTERSECTION COUNTERMEASURES FROM PROJECT SELECTION DECISION TREE

The countermeasures in this section were included in the project selection decision tree and recommended on the intersection project sheets based on the criteria described in **Section 6.3.1**.

Coordinate with Local Jurisdiction on Signal Modifications

Although there are not many traffic signals along the county road system which are operated and maintained by the county, the recommendations from this LRSP include a coordination item with the local jurisdiction at locations where signalized intersections scored high on the risk factor rankings. This coordination could include the installation of retroreflective backplates, installing larger signal heads, signal retiming, flashing yellow arrow implementation, and/or overhead signal installation.

Signal Warrant Analysis to Consider Removal of Signal

At locations where a signalized intersection may not be warranted, based on reported DEVs, it is recommended that a signal warrant analysis, including the required traffic counts, be conducted to determine if the traffic signal is warranted. Removing an unwarranted traffic signal has a documented CMF as high as 0.76. The cost associated with this recommendation includes only the counts and analysis, not the physical removal of the traffic signal.

Intersection Configuration Evaluation (ICE)

Per the Minnesota Department of Transportation (MnDOT),

“ICE is a process that identifies the best intersection control through a comprehensive analysis and documentation of the technical (safety and operational), economic, and political issues of viable alternatives” (<http://www.dot.state.mn.us/trafficeng/safety/ice/>).

This evaluation broadens the framework for consideration of intersection control beyond the traditional traffic signal. Through this evaluation process, the optimal control is anticipated to be recommended, based on an objective analysis. Stop signs, yield signs, channelized movements, access control, grade separation, roundabouts or fully signalized intersections can be the result of the ICE.

In 2007, the MnDOT's Office of Traffic, Safety, and Operations published an “Intersection Control Evaluation” manual (http://www.dot.state.mn.us/trafficeng/safety/ice/2007_ICE_Manual.pdf). This comprehensive manual describes in detail the process that is recommended in Minnesota. Many states currently have ICE policies and require ICE to be completed prior to determining intersection control and configurations, including: California, Indiana, Florida, Minnesota, Washington, and Wisconsin. The Iowa DOT is in the process of developing their own guidelines for ICE. The recommended process includes identifying intersections, collecting data, performing warrant analyses, analyzing alternatives, and selecting a preferred alternative. Following the scoping, an alternative is selected by preparing conceptual designs, identifying right-of-way requirements, estimating life-cycle costs, considering political impacts, reevaluating alternatives, and receiving staff approval. Finally, an ICE report is compiled, documenting the process and



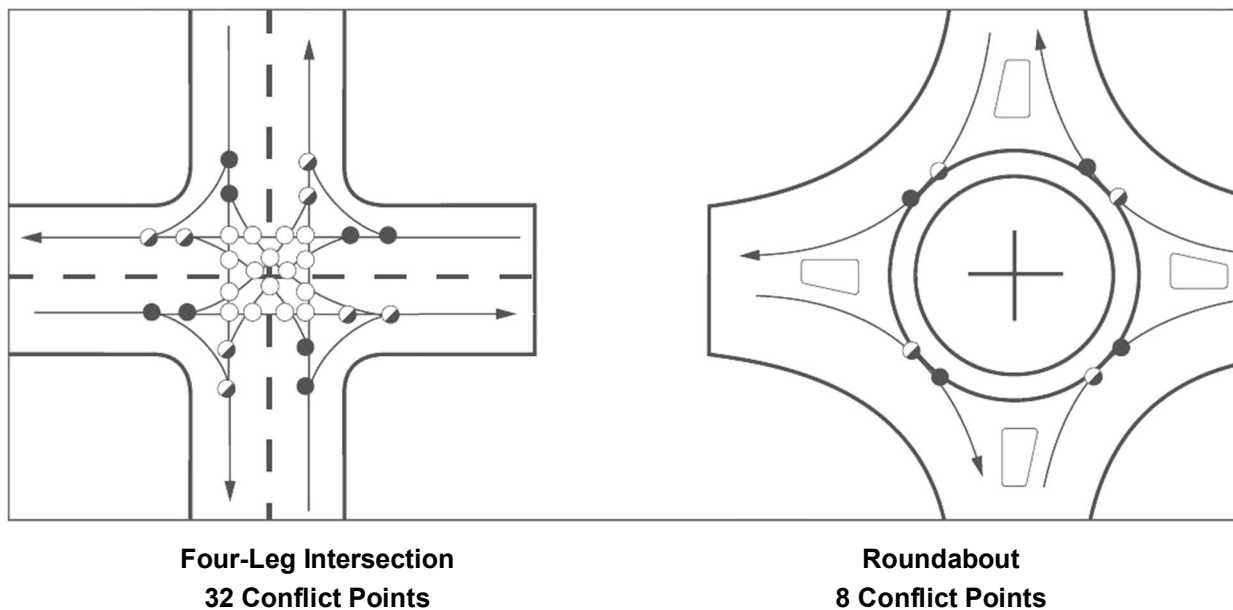
results. Additional guidance on ICE can be found in the California DOT (Caltrans) 2013 policy directive on ICE (<http://www.dot.ca.gov/trafficops/ice.html>).

The recommendation of conducting an ICE was based on K or A crash history, DEVs, and current signalization; or number of approaches. The cost estimate includes only the cost of the evaluation. The following countermeasure takes into account the cost for implementing the results of the ICE.

Implement Results of ICE

Along with the recommendation of the ICE, this recommendation includes implementing the selected intersection configuration. Since the evaluation is necessary to determine which configuration to implement, the cost associated with this recommendation is the estimated average of potential intersection configurations. Intersection configurations that could be considered include: roundabouts, multi-way stop control, traffic signals, restricting left-turn movements, median U-turn intersections, and grade separation. While roundabouts are not appropriate in every scenario, more information is provided here as roundabouts should be considered as part of the ICE and are a less traditional intersection configuration in Iowa.

Roundabouts are an FHWA proven safety countermeasure with marked safety improvements thoroughly documented. CMFs for converting a stop-controlled rural intersection to a roundabout have been recorded from 0.18 - 0.42 showing reductions in crashes as high as 82%. In addition to providing significant safety benefits, roundabouts are also able to accommodate abnormal intersections, such as intersections with more than four approaches or an angled minor or major approach. Many of the safety benefits of roundabouts stem from the fact that they have fewer conflict points (see **Figure C1**). In a conventional intersection, 32 conflict points exist at which a crash may occur. This is reduced to eight conflict points in a typical one-lane roundabout. Furthermore, the vehicle conflict points at a roundabout are unlikely to result in right-angle or head-on collisions which tend to be more severe crash types. Instead, the majority of crashes are rear-end or side-swipe collisions. In addition to less-severe crash types, crashes at roundabouts tend to occur at lower speeds which results in fewer injuries and fatalities.



Source: Federal Highway Administration

Figure C1 – Conflict Points at Intersections

All-Way Stop Warrant Analysis (Install)

This safety countermeasure includes conducting an all-way stop warrant analysis on an existing two-way stop-controlled intersection. The analysis should include a review of traffic volumes, crash history and sight distance as detailed in the MUTCD for an intersection that is not currently controlled by stop signs for all approaches. This safety countermeasure was recommended based on the CMFs in the range of 0.39 for converting a two-way stop-controlled intersection to all-way stop control. An engineering study is required to warrant the installation of all-way stop control. Only the analysis was recommended in the decision tree, based on traffic volumes that could potentially meet the minimum volume thresholds for an all-way stop to be warranted.

All-Way Stop Warrant Analysis (Remove)

This safety countermeasure includes conducting an all-way stop warrant analysis on an existing all-way stop-controlled intersection. The analysis should include a review of traffic volumes, crash history and sight distance as detailed in the MUTCD. An engineering study is required to warrant the removal of all-way stop control, converting to two-way stop control. Only the analysis was recommended in the decision tree, based on traffic volumes that would potentially not meet the minimum volume thresholds for an all-way stop to be warranted.

Destination Lighting

The Iowa DOT has a *Destination Lighting Specifics and Best Practices (2018)* document that should be consulted prior to installation of destination lighting. Various options are available including replacing existing HPS lights, new installations, and solar installations. The document provides detail on luminaire type, pole design, mounting height, pole placement, preferred luminaires, and sample specifications.

Destination lighting is different than typical intersection lighting, in that the purpose of destination lighting is to inform drivers, from a distance, that an intersection is located near the light. As can be seen in **Figure C2**, the High-Pressure Sodium (HPS) lighting option has traditionally provided a better spreading of light to the approaching driver when the Light-Emitting Diode (LED) system does not have a drop lens. LED lighting options without a drop lens dissipate less light outward and typically focus light down, towards the roadway. For the purpose of destination lighting, HPS or LED with drop lenses are preferred due to their dispersion of light. In rural situations, especially during nighttime conditions, intersections can be difficult to identify without the presence of destination lighting. For this purpose, destination lighting is recommended when certain volume thresholds defined in the decision tree are exceeded.



Figure C2 – Examples of Destination Lighting

Destination lighting, as a recommended safety countermeasure with a CMF of 0.62, can be installed on a new light pole or be attached to an existing utility pole near the subject intersection as shown in **Figure C3**. Some counties noted a preference to not install a new pole due to the increased maintenance and cost of a new pole while others have identified the coordination with the utility companies as a hindrance to installing destination lighting on an existing utility pole.



Figure C3 – Destination Lighting Installation Options

Upgrade Signs and Pavement Markings

Another low-cost intersection safety countermeasure includes the upgrading of signs and pavement markings. Providing “Stop Ahead” pavement markings has a recorded CMF range of 0.4 to 0.69, and increasing the retroreflectivity of stop signs (or replacing signs with new larger signs) has a CMF range of 0.75 to 0.91. The following improvements were recommended for applicable intersection approaches:

- Stop sign (R1-1 36”x36”) and post
 - Large stop sign for enhanced visibility from a greater distance
- All Way (plaque) (R1-3P 18”x6”) or Cross Traffic Does Not Stop (plaque) (W4-4P 24”x12”)
 - Informational plaque to provide valuable information to drivers
- Intersection Warning Sign and Post (W2-1 – W2-6 24”x24”)
 - Installed on uncontrolled intersection approaches to warn users of potential vehicle conflicts from the intersection roadway and/or vehicles slowing to make turns
- Stop ahead sign and post (W3-1 30”x30”)
 - This sign is installed upstream to inform drivers of upcoming stop-controlled conditions
- Stop ahead pavement markings



- Installed as a supplement to the “Stop Ahead” sign, this on-pavement marking has a recorded CMF of 0.4 to 0.69 adding reinforcement of the upcoming stop-controlled condition
- Stop bar
 - Installed to delineate where the driver should stop to check for oncoming vehicles and reinforce the stop-controlled condition with on-pavement markings at the intersection. This pavement marking can also be visible from cross-traffic, further delineating the intersection. In the case of an unpaved minor approach a stop bar may not be feasible, but is nevertheless recommended.
- Double yellow line 100’ back from the intersection
 - Provides additional delineation of the intersection

Install Second Stop Sign and Stop Ahead Signs

Installing a second stop sign and stop ahead sign on the left side of the roadway for reinforcement of the stop-controlled condition was another safety countermeasure that was suggested where certain volume thresholds were met. Installing the second stop sign and stop ahead signs on the left side of the roadway provides for additional visibility and reinforces the stop-controlled condition ahead.

Flashing Beacon on All Stop Signs

This countermeasure includes installing flashing beacons on top of all stop signs and/or yield signs at an intersection. It is anticipated that the flashing beacons would be solar-power LED beacons to expedite the installation and reduce the monthly cost associated with power for the lights. This countermeasure provides enhanced visibility and reinforcement of the stop/yield-controlled condition.

Transverse Rumble Strips on All or Minor Approaches

Installing transverse rumble strips can alert drivers of an upcoming stop sign. In the case of an all-way stop-controlled intersection, rumble strips are recommended on all approaches. For a one-way or two-way stop-controlled intersection, only the minor paved approaches (those that are stop-controlled) are recommended for rumble strip installation. Installing transverse rumble strips on stop-controlled approaches in rural areas has a CMF of 0.79 to 0.87.

Install Advanced Cross Street Name Signs (Major Approaches)

This safety countermeasure includes the installation of cross street name signs with the intersection warning signs in advance of an intersection on the major approaches to provide additional information to drivers, increasing their decision time and distance. This improvement also provides additional emphasis of an upcoming intersection.

Clear and Grub

This includes clearing and grubbing the areas within the sight triangles of the vehicles that approach stop signs at a given intersection. This safety countermeasure increases the sight distance for vehicles prior to entering an intersection. This is particularly beneficial under two-way stop-controlled or uncontrolled situations where conflicting vehicles may not stop or yield. A budgetary cost has been included in the project sheets; however, it is recommended that the County Engineer confirm the need to clear and grub as projects move forward.

OTHER INTERSECTION COUNTERMEASURES

There are a variety of other safety improvements that could be considered that were not included in the project selection decision tree due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed at intersections throughout the county. The following sections describe several other intersection safety improvements that could be considered appropriate by the county and that were included on the back side of the project sheets.

Construction of Turn Lanes

Providing right- and left-turn lanes to remove slowing or turning vehicles from the through lanes has CMFs ranging from 0.52 to 0.74. This safety countermeasure needs to be evaluated on a case-by-case basis based on turning movement volumes, which were not available as part of this project. This improvement can be particularly effective where there are high amounts of conflicting movements at intersections. When considering turn lanes for a specific location, right-of-way constraints will need to be considered.

Realignment of Intersection to Reduce or Eliminate Skew

Intersection skew was reviewed as part of the risk factor analysis, but realignment of specific intersections was not recommended, due to constraints such as right-of-way and geometrics that could not be determined from a systemic approach. Depending on existing site conditions, this countermeasure could be particularly beneficial and should be considered where feasible. The CMF for intersection geometry reconfiguration is included in the HSM and varies based on the existing skew angle. With the optimal 90-degree intersection configuration sight triangles are maximized, crossing distance is minimized, and the intersection meets typical driver expectations.

Provide Bypass Lane on Shoulder at T-Intersection

A bypass lane at a T-intersection allows through traffic a separate lane of travel from those vehicles intending to turn left at the intersection. This improvement removes some conflict points and has the potential to reduce the frequency of rear-end crashes.

Convert Offset T-Intersection to Four-Legged Intersection

Where two offset T-intersections are within close proximity, this countermeasure suggests combining the two intersections into a single four-legged intersection. The consolidation of the two intersections into one reduces conflict points and aligns better with driver expectations.

Use Indirect Left-Turn Treatments

Restricting or eliminating turning maneuvers by providing channelization or closing median openings can have significant safety benefits. This safety countermeasure could be implemented as part of an access management policy, referenced below. A CMF of 0.8 has been determined for providing indirect left-turn treatments.

Convert Four-Legged Intersection to Offset T-Intersection

Where a four-legged intersection has high opposing turning movements, two offset T-intersections may provide the needed traffic flow while reducing conflicts.



Install LED Flashing Beacons on Intersection Warning Signs

Flashing beacons draw the attention of drivers to the associated signage. This improvement enhances the conspicuity of intersection warning signs for drivers approaching the intersection. This sign/beacon combination can help increase awareness of drivers to potential upcoming vehicle conflicts. Flashing beacons on stop signs and curve chevron signs have measured safety benefits and are expected to provide safety benefits when applied to intersection warning signs as well.

Stop Signs with LED Flashing Lights

Installing stop signs with LEDs embedded in the border of the sign can increase the conspicuity of the sign from a greater distance, particularly at nighttime. A CMF of 0.59 has been recorded for replacing a standard stop sign with a stop sign with LED flashing lights.

Install Retroreflective Strips on Stop Sign Posts

This countermeasure includes the installation of retroreflective strips on the posts of stop signs. The strips can increase the visibility of the stop signs and increase driver awareness of a stop-controlled intersection.

Low-Cost Intersection Conflict Warning System (ICWS)

This safety improvement warns vehicles on the major approach of a two-way stop-controlled intersection when there is a vehicle present/stopped at the upcoming intersection. According to the FHWA,

“These systems usually use a double set of detectors on the stop approach to identify approaching and stopped vehicles and warn traffic on the through approach of their presence using activated flashing beacons on passive intersection warning signs to indicate that a vehicle from the cross street may enter the intersection. They are often deployed at rural stop-controlled intersections that have either a history of crash experience or limited sight distance. Missouri, Minnesota, North Carolina, Pennsylvania, and Virginia have deployed these systems or variations of them.”

The FHWA also states that, this technology “has been successfully deployed... at a relatively low cost per intersection and has generally resulted in substantial intersection crash reductions.”

Access Management

According to the Transportation Research Board, “Access management is the systematic control of the location, spacing, design and operation of driveways, median openings, interchanges, and street connections to a roadway.” Various counties throughout Iowa have access management policies in place and substantial research has been conducted supporting the safety, operations, economic, and environmental effects of access management.

Figure C4 shows a generic definition of the functional area of an intersection. This area includes regions where vehicle speeds vary in order to change lanes and complete turns. Queues may also develop on the approach legs of the intersection. Driveways should be located outside of the functional area of the intersection so as not to negatively impact the operations of the intersection.

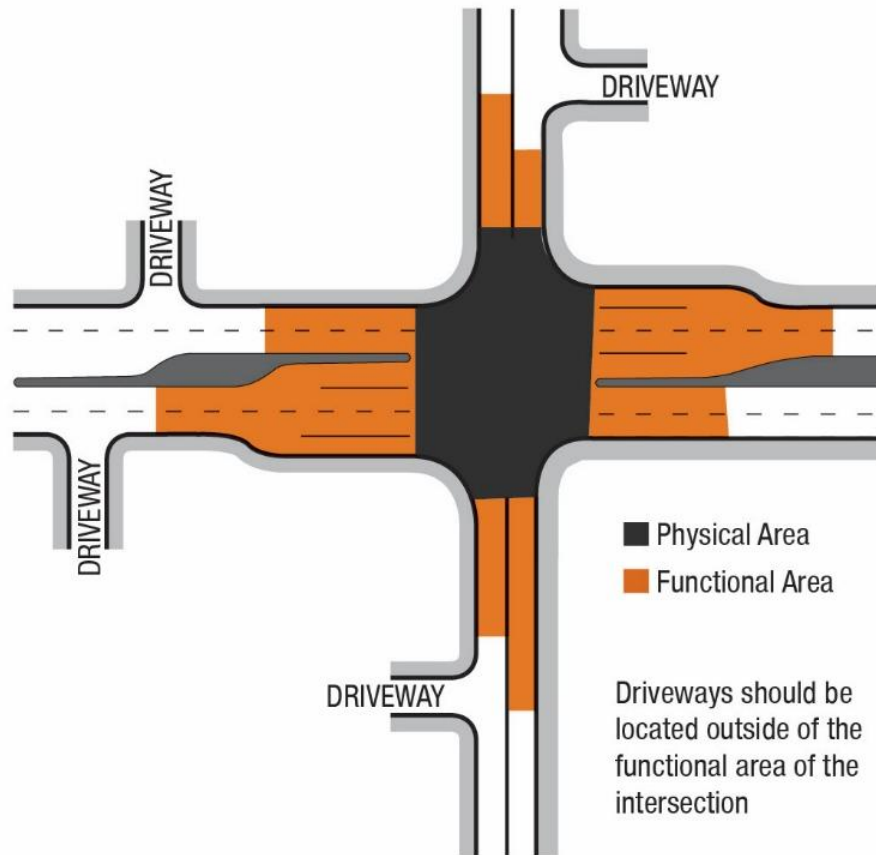


Figure C4 – Intersection Functional Area

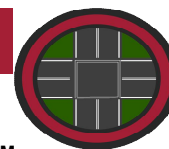
In rural scenarios, access management is best applied by limiting left-turn movements onto high-speed roadways and providing sufficient spacing between roadway access points. Please refer to the *Statewide Urban Design and Specifications* (SUDAS) and AASHTO's *A Policy on Geometric Design of Highways and Streets* (Green Book) for more information.

APPENDIX C2
INTERSECTION PROJECT SHEETS

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 18



Project Name: Co Rd D43/CO RTE D43/290TH ST & Co Rd P61/PARAGON AVE
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountya.org

Date: 9/20/17

Prepared By: DJG/DVM
 Checked By: MMO

INTERSECTION

Location Description

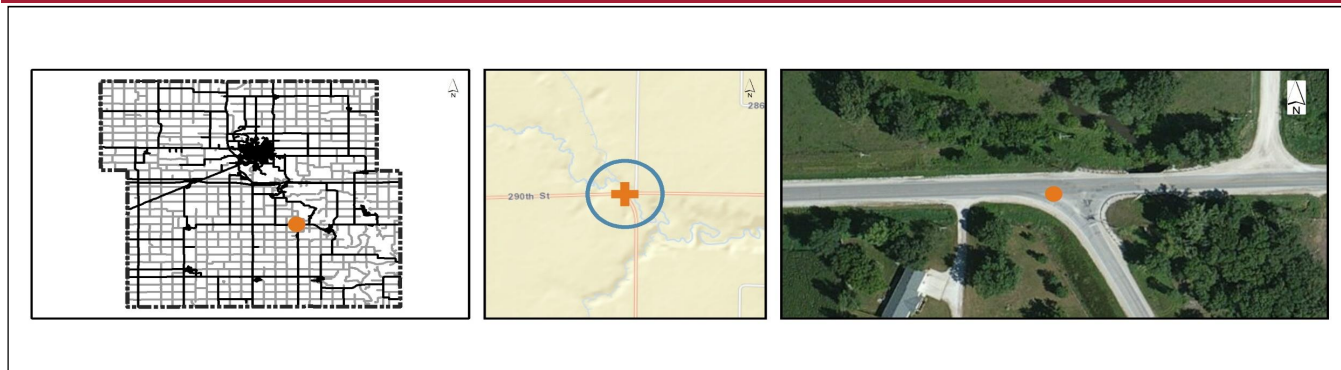
Road: Co Rd D43/CO RTE D43/290TH ST
 Road: Co Rd P61/PARAGON AVE

Closest City: LEHIGH

GPS ID: 563547

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	7 mi	4
Approach Angle (Degrees)	65	4
Intersection within Curve	Yes	4
Daily Entering Vehicles	1,440	3
Minor Street Volume	530	2
Roads/Driveways within 250 Feet	1	1
K or A Crashes	0	0
Number of Approaches	3	0
Total Risk Factor Points (22 max)		18

Other Information	
Number of Approaches	3
Number of Paved Approaches	3
Major ADT	1,010
Minor ADT	530
Destination Lighting	Yes
Transverse Rumble Strips (Number of Approaches)	1
Control Type	One-way stop

Crash Data, 2007-2016	
Total Crashes	2
K and A Crashes	0
Right Angle, Rear-end, or Turning Crashes	1
Total Nighttime Crashes	0
Nighttime/Daytime Crash Ratio*	0.0

Key Emphasis Areas
Intersections Local Roads

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	\$ 2,500	\$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	\$ 5,000	\$ -
Intersection Configuration Evaluation (ICE)	0	EA	\$ 25,000	\$ -
Implement Results of ICE	0	EA	\$ 750,000	\$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	\$ 5,000	\$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	\$ 5,000	\$ -
Install Destination Lighting	0	LEG	\$ 8,000	\$ -
Upgrade Signs and Pavement Markings	1	LEG	\$ 2,200	\$ 2,200
Upgrade Signs (Unpaved Approaches)	0	LEG	\$ 1,000	\$ -
Install Second Stop Sign and Stop Ahead Sign	1	LEG	\$ 1,200	\$ 1,200
Install Solar-Powered Flashing Beacon on Stop Sign	2	EA	\$ 2,500	\$ 5,000
Install Transverse Rumble Strips	0	LEG	\$ 1,000	\$ -
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	2	LEG	\$ 1,200	\$ 2,400
Clear and Grub within Sight Triangle	2	LEG	\$ 1,500	\$ 3,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 13,800

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* Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:

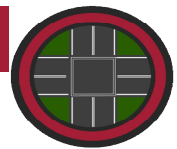
Esri, DeLorme, NAVTEQ, USGS, Intermap, INCREMENT P, NRCA, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, OpenStreetMap contributors, and the GIS User Community

Front Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 18



Project Name: Co Rd D43/CO RTE D43/290TH ST & Co Rd P61/PARAGON AVE
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountya.org

Date: 9/20/17

Prepared By: DJG/DVM
 Checked By: MMO

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 563547

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Provide Right-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Realign Intersection Approaches to Reduce or Eliminate Intersection Skew						LEG	\$ 200,000	\$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	\$ 50,000	\$ -
Convert Offset T-Intersection to Four-Legged Intersection						EA	\$ 300,000	\$ -
Use Indirect Left-Turn Treatments to Minimize Conflicts at Divided Highway Intersection						LEG	\$ 75,000	\$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	\$ 300,000	\$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	\$ 2,500	\$ -
Install Stop Signs with LED Flashing Lights						LEG	\$ 2,500	\$ -
Install Retroreflective Strips on Stop Sign Posts						EA	\$ 100	\$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	\$ 15,000	\$ -
Flashing Beacon on Intersection Warning Signs						SIGN	\$ 2,500	\$ -
Other:								
Other:								
Additional Potential Improvements Subtotal:								\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:								\$ 13,800
Subtotal:								\$ 13,800
Mobilization: (% +/-)* 10%								\$ 2,500
Traffic Control: (% +/-) 5%								\$ 740
Contingency: (% +/-) 20%								\$ 2,960
Estimated Project Cost								\$ 20,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only Kimley-Horn's judgment as a design professional familiar with the construction industry. Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:

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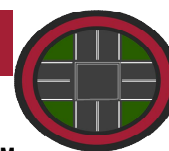
End of Project Description

Back Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 16



Project Name: Co Rd D46/290TH ST & Co Rd P6D/SAMSON AVE & E HILL ST & DIAMOND AVE
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountyia.org

Date: 9/20/17

Prepared By: DJG/DVM
 Checked By: MMO

INTERSECTION

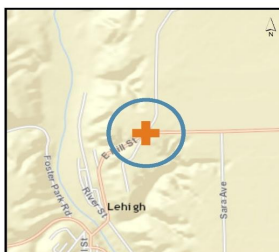
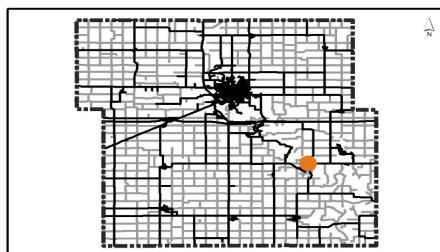
Location Description

Road: Co Rd D46/290TH ST Closest City: LEHIGH
 Road: Co Rd P6D/SAMSON AVE & E HILL ST & DIAMOND AVE

GPS ID: 563478

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	6 mi	4
Approach Angle (Degrees)	27	4
Intersection within Curve	No	0
Daily Entering Vehicles	1,130	2
Minor Street Volume	370	2
Roads/Driveways within 250 Feet	2	1
K or A Crashes	1	2
Number of Approaches	4	1
Total Risk Factor Points (22 max)		16

Other Information	
Number of Approaches	4
Number of Paved Approaches	3
Major ADT	1,070
Minor ADT	370
Destination Lighting	Yes
Transverse Rumble Strips (Number of Approaches)	1
Control Type	Two-way stop

Crash Data, 2007-2016	
Total Crashes	3
K and A Crashes	1
Right Angle, Rear-end, or Turning Crashes	1
Total Nighttime Crashes	0
Nighttime/Daytime Crash Ratio*	0.0

Key Emphasis Areas
Intersections Local Roads

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	\$ 2,500	\$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	\$ 5,000	\$ -
Intersection Configuration Evaluation (ICE)	0	EA	\$ 25,000	\$ -
Implement Results of ICE	0	EA	\$ 750,000	\$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	\$ 5,000	\$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	\$ 5,000	\$ -
Install Destination Lighting	0	LEG	\$ 8,000	\$ -
Upgrade Signs and Pavement Markings	1	LEG	\$ 2,200	\$ 2,200
Upgrade Signs (Unpaved Approaches)	1	LEG	\$ 1,000	\$ 1,000
Install Second Stop Sign and Stop Ahead Sign	1	LEG	\$ 1,200	\$ 1,200
Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	\$ 2,500	\$ -
Install Transverse Rumble Strips	0	LEG	\$ 1,000	\$ -
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	2	LEG	\$ 1,200	\$ 2,400
Clear and Grub within Sight Triangle	4	LEG	\$ 1,500	\$ 6,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 12,800

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* Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:

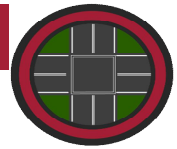
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Front Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 16



Project Name: Co Rd D46/290TH ST & Co Rd P6D/SAMSON AVE & E HILL ST & DIAMOND AVE
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountyia.org

Date: 9/20/17

Prepared By: DJG/DVM
 Checked By: MMO

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 563478

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Provide Right-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
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Provide Bypass Lane on Shoulder at T-intersection						EA	\$ 50,000	\$ -
Convert Offset T-Intersection to Four-Legged Intersection						EA	\$ 300,000	\$ -
Use Indirect Left-Turn Treatments to Minimize Conflicts at Divided Highway Intersection						LEG	\$ 75,000	\$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	\$ 300,000	\$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	\$ 2,500	\$ -
Install Stop Signs with LED Flashing Lights						LEG	\$ 2,500	\$ -
Install Retroreflective Strips on Stop Sign Posts						EA	\$ 100	\$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	\$ 15,000	\$ -
Flashing Beacon on Intersection Warning Signs						SIGN	\$ 2,500	\$ -
Other:								
Other:								
Additional Potential Improvements Subtotal:								\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:								\$ 12,800
Subtotal:								\$ 12,800
Mobilization: (% +/-)* 10%								\$ 2,500
Traffic Control: (% +/-) 5%								\$ 740
Contingency: (% +/-) 20%								\$ 2,960
Estimated Project Cost								\$ 19,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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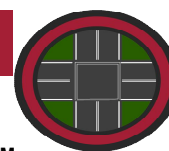
End of Project Description

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Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 16



Project Name: FRONT ST & HOOD ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 9/20/17

Prepared By: DJG/DVM
Checked By: MMO

INTERSECTION

Location Description

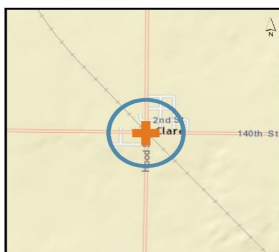
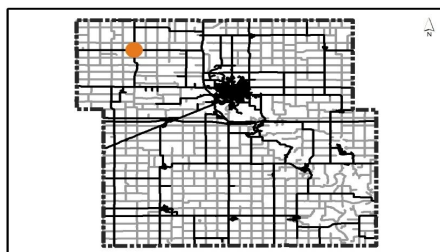
Road: FRONT ST
Road: HOOD ST

Closest City: CLARE

GPS ID: 564811

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	5 mi	4
Approach Angle (Degrees)	50	4
Intersection within Curve	No	0
Daily Entering Vehicles	1,325	3
Minor Street Volume	560	2
Roads/Driveways within 250 Feet	6	2
K or A Crashes	0	0
Number of Approaches	4	1
Total Risk Factor Points (22 max)		16

Other Information	
Number of Approaches	4
Number of Paved Approaches	4
Major ADT	750
Minor ADT	560
Destination Lighting	Yes
Transverse Rumble Strips (Number of Approaches)	1
Control Type	All-way stop

Crash Data, 2007-2016	
Total Crashes	1
K and A Crashes	0
Right Angle, Rear-end, or Turning Crashes	1
Total Nighttime Crashes	1
Nighttime/Daytime Crash Ratio*	3.0

Key Emphasis Areas
Intersections Local Roads

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	\$ 2,500	\$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	\$ 5,000	\$ -
Intersection Configuration Evaluation (ICE)	0	EA	\$ 25,000	\$ -
Implement Results of ICE	0	EA	\$ 750,000	\$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	\$ 5,000	\$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	1	EA	\$ 5,000	\$ 5,000
Install Destination Lighting	0	LEG	\$ 8,000	\$ -
Upgrade Signs and Pavement Markings	4	LEG	\$ 2,200	\$ 8,800
Upgrade Signs (Unpaved Approaches)	0	LEG	\$ 1,000	\$ -
Install Second Stop Sign and Stop Ahead Sign	4	LEG	\$ 1,200	\$ 4,800
Install Solar-Powered Flashing Beacon on Stop Sign	8	EA	\$ 2,500	\$ 20,000
Install Transverse Rumble Strips	0	LEG	\$ 1,000	\$ -
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	4	LEG	\$ 1,200	\$ 4,800
Clear and Grub within Sight Triangle	4	LEG	\$ 1,500	\$ 6,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 49,400

Continued on back of this page.

* Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

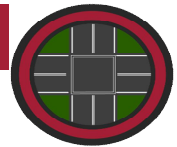
Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, INCREMENT P, NRCA, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, OpenStreetMap contributors, and the GIS User Community

Front Page

Local Road Safety Plan
Project Description for Intersection Improvements

Risk Factor Points: 16



Project Name: FRONT ST & HOOD ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountytia.org

Date: 9/20/17

Prepared By: DJG/DVM
Checked By: MMO

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 564811

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Provide Right-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Realign Intersection Approaches to Reduce or Eliminate Intersection Skew						LEG	\$ 200,000	\$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	\$ 50,000	\$ -
Convert Offset T-Intersection to Four-Legged Intersection						EA	\$ 300,000	\$ -
Use Indirect Left-Turn Treatments to Minimize Conflicts at Divided Highway Intersection						LEG	\$ 75,000	\$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	\$ 300,000	\$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	\$ 2,500	\$ -
Install Stop Signs with LED Flashing Lights						LEG	\$ 2,500	\$ -
Install Retroreflective Strips on Stop Sign Posts						EA	\$ 100	\$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	\$ 15,000	\$ -
Flashing Beacon on Intersection Warning Signs						SIGN	\$ 2,500	\$ -
Other:								
Other:								
Additional Potential Improvements Subtotal:								\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:								\$ 49,400
Subtotal:								\$ 49,400
Mobilization: (% +/-)* 10%								\$ 4,940
Traffic Control: (% +/-) 5%								\$ 2,532
Contingency: (% +/-) 20%								\$ 10,128
Estimated Project Cost								\$ 67,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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Project Description Form Disclaimer:

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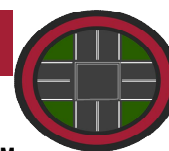
End of Project Description

Back Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: **15**



Project Name: Co Rd D20/XAVIER AVE & SIMPSON ST
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountya.org

Date: 9/20/17

Prepared By: DJG/DVM
 Checked By: MMO

INTERSECTION

Location Description

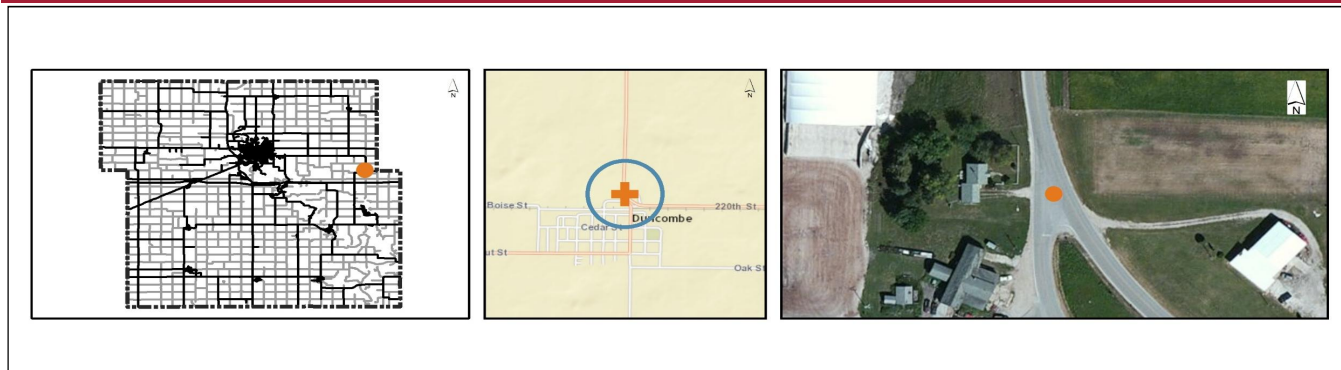
Road: Co Rd D20/XAVIER AVE
 Road: SIMPSON ST

Closest City: DUNCOMBE

GPS ID: 564089

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	< 1.5 mi	0
Approach Angle (Degrees)	40	4
Intersection within Curve	Yes	4
Daily Entering Vehicles	2,640	3
Minor Street Volume	900	2
Roads/Driveways within 250 Feet	3	2
K or A Crashes	0	0
Number of Approaches	3	0
Total Risk Factor Points (22 max)		15

Other Information	
Number of Approaches	3
Number of Paved Approaches	3
Major ADT	2,140
Minor ADT	900
Destination Lighting	No
Transverse Rumble Strips (Number of Approaches)	0
Control Type	One-way stop

Crash Data, 2007-2016	
Total Crashes	4
K and A Crashes	0
Right Angle, Rear-end, or Turning Crashes	0
Total Nighttime Crashes	3
Nighttime/Daytime Crash Ratio*	9.0

Key Emphasis Areas
Intersections Local Roads

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	\$ 2,500	\$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	\$ 5,000	\$ -
Intersection Configuration Evaluation (ICE)	0	EA	\$ 25,000	\$ -
Implement Results of ICE	0	EA	\$ 750,000	\$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	\$ 5,000	\$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	\$ 5,000	\$ -
Install Destination Lighting	1	LEG	\$ 8,000	\$ 8,000
Upgrade Signs and Pavement Markings	1	LEG	\$ 2,200	\$ 2,200
Upgrade Signs (Unpaved Approaches)	0	LEG	\$ 1,000	\$ -
Install Second Stop Sign and Stop Ahead Sign	1	LEG	\$ 1,200	\$ 1,200
Install Solar-Powered Flashing Beacon on Stop Sign	2	EA	\$ 2,500	\$ 5,000
Install Transverse Rumble Strips	1	LEG	\$ 1,000	\$ 1,000
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	2	LEG	\$ 1,200	\$ 2,400
Clear and Grub within Sight Triangle	2	LEG	\$ 1,500	\$ 3,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 22,800

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* Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:

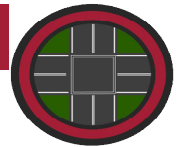
Esri, DeLorme, NAVTEQ, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, OpenStreetMap contributors, and the GIS User Community

Front Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 15



Project Name: Co Rd D20/XAVIER AVE & SIMPSON ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountytia.org

Date: 9/20/17

Prepared By: DJG/DVM
Checked By: MMO

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 564089

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Provide Right-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Realign Intersection Approaches to Reduce or Eliminate Intersection Skew						LEG	\$ 200,000	\$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	\$ 50,000	\$ -
Convert Offset T-Intersection to Four-Legged Intersection						EA	\$ 300,000	\$ -
Use Indirect Left-Turn Treatments to Minimize Conflicts at Divided Highway Intersection						LEG	\$ 75,000	\$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	\$ 300,000	\$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	\$ 2,500	\$ -
Install Stop Signs with LED Flashing Lights						LEG	\$ 2,500	\$ -
Install Retroreflective Strips on Stop Sign Posts						EA	\$ 100	\$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	\$ 15,000	\$ -
Flashing Beacon on Intersection Warning Signs						SIGN	\$ 2,500	\$ -
Other:								
Other:								
Additional Potential Improvements Subtotal:								\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:								\$ 22,800
Subtotal:								\$ 22,800
Mobilization: (% +/-)* 10%								\$ 2,500
Traffic Control: (% +/-) 5%								\$ 1,140
Contingency: (% +/-) 20%								\$ 4,560
Estimated Project Cost								\$ 31,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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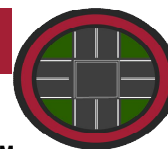
End of Project Description

Back Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: **15**



Project Name: Co Rd D14/170TH ST & NATIONAL AVE
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountya.org

Date: 9/20/17

Prepared By: DJG/DVM
 Checked By: MMO

INTERSECTION

Location Description

Road: Co Rd D14/170TH ST
 Road: NATIONAL AVE

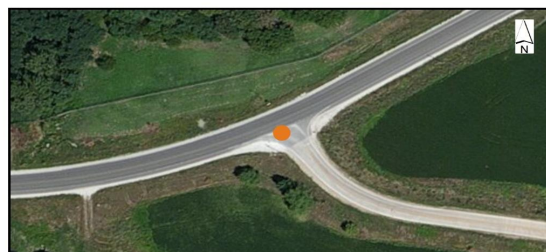
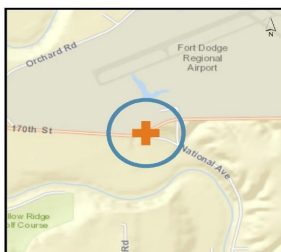
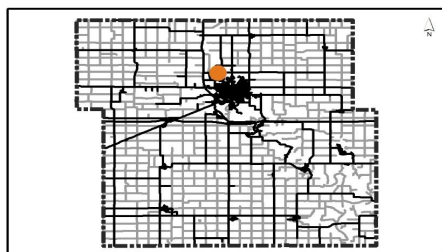
Closest City: FORT DODGE

GPS ID: 564105

This intersection is located on the following high scoring segment: GPS ID 2797

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	< 1.5 mi	0
Approach Angle (Degrees)	67	4
Intersection within Curve	Yes	4
Daily Entering Vehicles	2,460	3
Minor Street Volume	500	2
Roads/Driveways within 250 Feet	0	0
K or A Crashes	1	2
Number of Approaches	3	0
Total Risk Factor Points (22 max)		15

Other Information	
Number of Approaches	3
Number of Paved Approaches	3
Major ADT	2,700
Minor ADT	500
Destination Lighting	Yes
Transverse Rumble Strips (Number of Approaches)	0
Control Type	One-way stop

Crash Data, 2007-2016	
Total Crashes	3
K and A Crashes	1
Right Angle, Rear-end, or Turning Crashes	0
Total Nighttime Crashes	2
Nighttime/Daytime Crash Ratio*	6.0

Key Emphasis Areas
Intersections Local Roads

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	\$ 2,500	\$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	\$ 5,000	\$ -
Intersection Configuration Evaluation (ICE)	0	EA	\$ 25,000	\$ -
Implement Results of ICE	0	EA	\$ 750,000	\$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	\$ 5,000	\$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	\$ 5,000	\$ -
Install Destination Lighting	0	LEG	\$ 8,000	\$ -
Upgrade Signs and Pavement Markings	1	LEG	\$ 2,200	\$ 2,200
Upgrade Signs (Unpaved Approaches)	0	LEG	\$ 1,000	\$ -
Install Second Stop Sign and Stop Ahead Sign	1	LEG	\$ 1,200	\$ 1,200
Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	\$ 2,500	\$ -
Install Transverse Rumble Strips	1	LEG	\$ 1,000	\$ 1,000
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	2	LEG	\$ 1,200	\$ 2,400
Clear and Grub within Sight Triangle	2	LEG	\$ 1,500	\$ 3,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 9,800

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* Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:

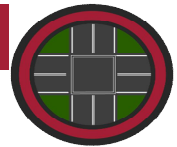
Esri, DeLorme, NAVTEQ, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, OpenStreetMap contributors, and the GIS User Community

Front Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 15



Project Name: Co Rd D14/170TH ST & NATIONAL AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 9/20/17

Prepared By: DJG/DVM
Checked By: MMO

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 564105

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Provide Right-Turn Lanes at Intersection			X		1	LEG	\$ 75,000	\$ 75,000
Realign Intersection Approaches to Reduce or Eliminate Intersection Skew						LEG	\$ 200,000	\$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	\$ 50,000	\$ -
Convert Offset T-Intersection to Four-Legged Intersection						EA	\$ 300,000	\$ -
Use Indirect Left-Turn Treatments to Minimize Conflicts at Divided Highway Intersection						LEG	\$ 75,000	\$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	\$ 300,000	\$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	\$ 2,500	\$ -
Install Stop Signs with LED Flashing Lights						LEG	\$ 2,500	\$ -
Install Retroreflective Strips on Stop Sign Posts						EA	\$ 100	\$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	\$ 15,000	\$ -
Flashing Beacon on Intersection Warning Signs						SIGN	\$ 2,500	\$ -
Other:								
Other:								
Additional Potential Improvements Subtotal:								\$ 75,000
Project Selection Decision Tree Systemic Improvements Subtotal:								\$ 9,800
Subtotal:								\$ 84,800
Mobilization: (% +/-)* 10%								\$ 8,480
Traffic Control: (% +/-) 5%								\$ 4,344
Contingency: (% +/-) 20%								\$ 17,376
Estimated Project Cost								\$ 115,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

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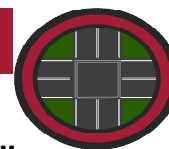
End of Project Description

Back Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 15



Project Name: Co Rd D14/170TH ST & MADISON AVE
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountyia.org

Date: 9/20/17

Prepared By: DJG/DVM
 Checked By: MMO

INTERSECTION

Location Description

Road: Co Rd D14/170TH ST
 Road: MADISON AVE

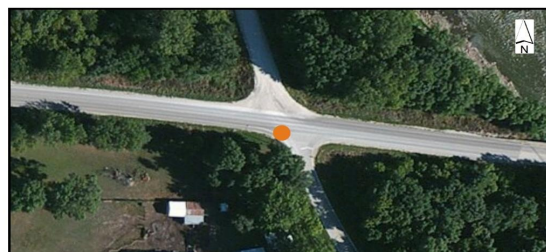
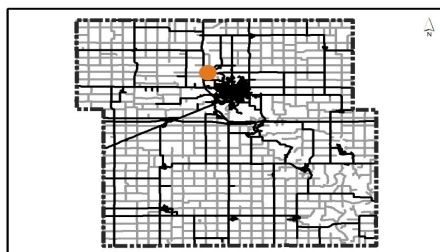
Closest City: FORT DODGE

GPS ID: 564208

This intersection is located on the following high scoring segment: GPS ID 2797

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	< 1.5 mi	0
Approach Angle (Degrees)	55	4
Intersection within Curve	Yes	4
Daily Entering Vehicles	2,750	3
Minor Street Volume	590	2
Roads/Driveways within 250 Feet	1	1
K or A Crashes	0	0
Number of Approaches	4	1
Total Risk Factor Points (22 max)		15

Other Information	
Number of Approaches	4
Number of Paved Approaches	3
Major ADT	3,200
Minor ADT	590
Destination Lighting	Yes
Transverse Rumble Strips (Number of Approaches)	0
Control Type	Two-way stop

Crash Data, 2007-2016	
Total Crashes	5
K and A Crashes	0
Right Angle, Rear-end, or Turning Crashes	3
Total Nighttime Crashes	1
Nighttime/Daytime Crash Ratio*	0.8

Key Emphasis Areas
Intersections Local Roads

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	\$ 2,500	\$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	\$ 5,000	\$ -
Intersection Configuration Evaluation (ICE)	0	EA	\$ 25,000	\$ -
Implement Results of ICE	0	EA	\$ 750,000	\$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	\$ 5,000	\$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	\$ 5,000	\$ -
Install Destination Lighting	0	LEG	\$ 8,000	\$ -
Upgrade Signs and Pavement Markings	1	LEG	\$ 2,200	\$ 2,200
Upgrade Signs (Unpaved Approaches)	1	LEG	\$ 1,000	\$ 1,000
Install Second Stop Sign and Stop Ahead Sign	1	LEG	\$ 1,200	\$ 1,200
Install Solar-Powered Flashing Beacon on Stop Sign	2	EA	\$ 2,500	\$ 5,000
Install Transverse Rumble Strips	1	LEG	\$ 1,000	\$ 1,000
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	2	LEG	\$ 1,200	\$ 2,400
Clear and Grub within Sight Triangle	4	LEG	\$ 1,500	\$ 6,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 18,800

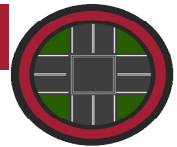
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* Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, OpenStreetMap contributors, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Intersection Improvements****Risk Factor Points: 15**

Project Name: Co Rd D14/170TH ST & MADISON AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountytia.org

Date: 9/20/17

Prepared By: DJG/DVM
Checked By: MMO

INTERSECTION**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID:** 564208

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Provide Right-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Realign Intersection Approaches to Reduce or Eliminate Intersection Skew						LEG	\$ 200,000	\$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	\$ 50,000	\$ -
Convert Offset T-Intersection to Four-Legged Intersection						EA	\$ 300,000	\$ -
Use Indirect Left-Turn Treatments to Minimize Conflicts at Divided Highway Intersection						LEG	\$ 75,000	\$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	\$ 300,000	\$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	\$ 2,500	\$ -
Install Stop Signs with LED Flashing Lights						LEG	\$ 2,500	\$ -
Install Retroreflective Strips on Stop Sign Posts						EA	\$ 100	\$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	\$ 15,000	\$ -
Flashing Beacon on Intersection Warning Signs						SIGN	\$ 2,500	\$ -
Other:								
Other:								
Additional Potential Improvements Subtotal:								\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:								\$ 18,800
Subtotal:								\$ 18,800
Mobilization: (% +/-)* 10%								\$ 2,500
Traffic Control: (% +/-) 5%								\$ 940
Contingency: (% +/-) 20%								\$ 3,760
Estimated Project Cost								\$ 26,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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Project Description Form Disclaimer:

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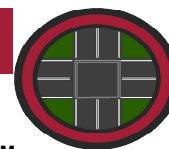
End of Project Description

Back Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 15



Project Name: US 169/360TH ST/LAINSON AVE & IA 175 & Co Rd P46
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountya.org

Date: 9/20/17

Prepared By: DJG/DVM
 Checked By: MMO

INTERSECTION

Location Description

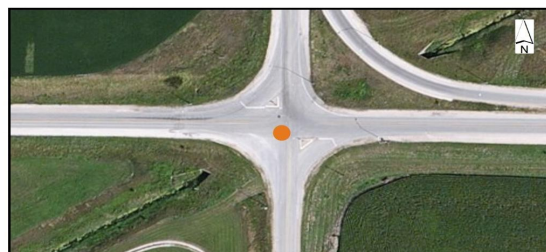
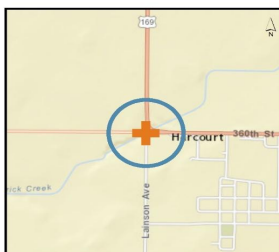
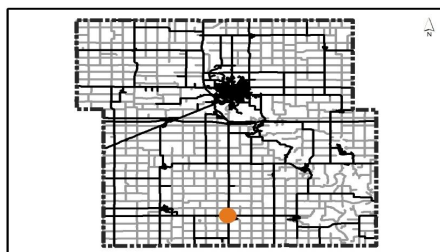
Road: US 169/360TH ST/LAINSON AVE
 Road: IA 175 & Co Rd P46

Closest City: HARCOURT

GPS ID: 704672

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	7 mi	4
Approach Angle (Degrees)	90	0
Intersection within Curve	Yes	4
Daily Entering Vehicles	2,770	3
Minor Street Volume	1,560	2
Roads/Driveways within 250 Feet	1	1
K or A Crashes	0	0
Number of Approaches	4	1
Total Risk Factor Points (22 max)		15

Other Information	
Number of Approaches	4
Number of Paved Approaches	4
Major ADT	2,070
Minor ADT	1,560
Destination Lighting	Yes
Transverse Rumble Strips (Number of Approaches)	1
Control Type	All-way stop

Crash Data, 2007-2016	
Total Crashes	17
K and A Crashes	0
Right Angle, Rear-end, or Turning Crashes	13
Total Nighttime Crashes	4
Nighttime/Daytime Crash Ratio*	0.9

Key Emphasis Areas
Intersections Local Roads

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	\$ 2,500	\$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	\$ 5,000	\$ -
Intersection Configuration Evaluation (ICE)	0	EA	\$ 25,000	\$ -
Implement Results of ICE	0	EA	\$ 750,000	\$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	\$ 5,000	\$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	1	EA	\$ 5,000	\$ 5,000
Install Destination Lighting	0	LEG	\$ 8,000	\$ -
Upgrade Signs and Pavement Markings	4	LEG	\$ 2,200	\$ 8,800
Upgrade Signs (Unpaved Approaches)	0	LEG	\$ 1,000	\$ -
Install Second Stop Sign and Stop Ahead Sign	4	LEG	\$ 1,200	\$ 4,800
Install Solar-Powered Flashing Beacon on Stop Sign	8	EA	\$ 2,500	\$ 20,000
Install Transverse Rumble Strips	3	LEG	\$ 1,000	\$ 3,000
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	4	LEG	\$ 1,200	\$ 4,800
Clear and Grub within Sight Triangle	4	LEG	\$ 1,500	\$ 6,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 52,400

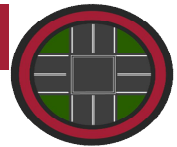
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* Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, INCREMENT P, NRCA, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, OpenStreetMap contributors, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Intersection Improvements****Risk Factor Points: 15**

Project Name: US 169/360TH ST/LAINSON AVE & IA 175 & Co Rd P46
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 9/20/17

Prepared By: DJG/DVM
Checked By: MMO

INTERSECTION**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID:** 704672

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Provide Right-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Realign Intersection Approaches to Reduce or Eliminate Intersection Skew						LEG	\$ 200,000	\$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	\$ 50,000	\$ -
Convert Offset T-Intersection to Four-Legged Intersection						EA	\$ 300,000	\$ -
Use Indirect Left-Turn Treatments to Minimize Conflicts at Divided Highway Intersection						LEG	\$ 75,000	\$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	\$ 300,000	\$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	\$ 2,500	\$ -
Install Stop Signs with LED Flashing Lights						LEG	\$ 2,500	\$ -
Install Retroreflective Strips on Stop Sign Posts						EA	\$ 100	\$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	\$ 15,000	\$ -
Flashing Beacon on Intersection Warning Signs						SIGN	\$ 2,500	\$ -
Other:								
Other:								
Additional Potential Improvements Subtotal:								\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:								\$ 52,400
Subtotal:								\$ 52,400
Mobilization: (% +/-)* 10%								\$ 5,240
Traffic Control: (% +/-) 5%								\$ 2,672
Contingency: (% +/-) 20%								\$ 10,688
Estimated Project Cost								\$ 71,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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Project Description Form Disclaimer:

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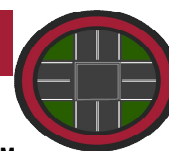
End of Project Description

Back Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 14



Project Name: US 169/PARAGON AVE/360TH ST & IA 175 & Co Rd P61
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountyia.org

Date: 9/20/17

Prepared By: DJG/DVM
 Checked By: MMO

INTERSECTION

Location Description

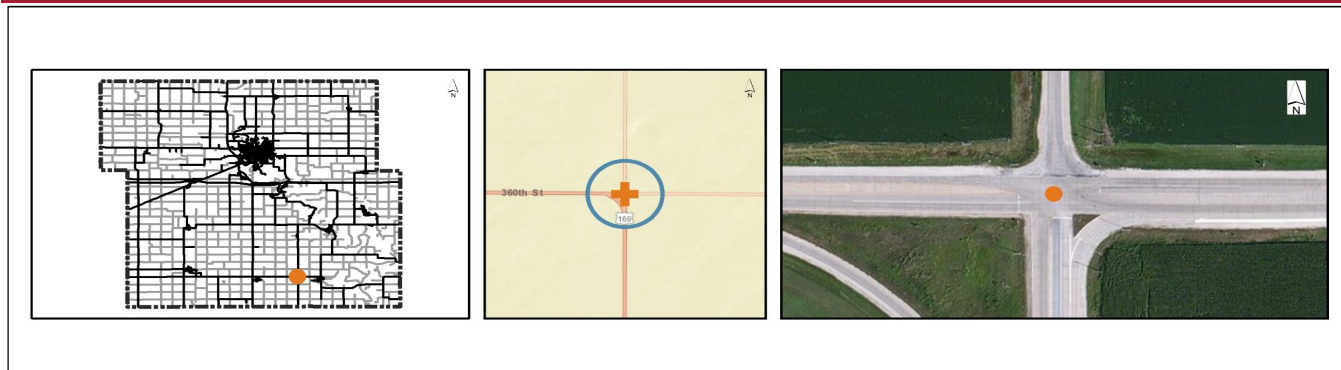
Road: US 169/PARAGON AVE/360TH ST
 Road: IA 175 & Co Rd P61

Closest City: DAYTON

GPS ID: 704678

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	7 mi	4
Approach Angle (Degrees)	90	0
Intersection within Curve	Yes	4
Daily Entering Vehicles	2,740	3
Minor Street Volume	1,080	2
Roads/Driveways within 250 Feet	0	0
K or A Crashes	0	0
Number of Approaches	4	1
Total Risk Factor Points (22 max)		14

Other Information	
Number of Approaches	4
Number of Paved Approaches	4
Major ADT	1,770
Minor ADT	1,080
Destination Lighting	Yes
Transverse Rumble Strips (Number of Approaches)	1
Control Type	All-way stop

Crash Data, 2007-2016	
Total Crashes	3
K and A Crashes	0
Right Angle, Rear-end, or Turning Crashes	2
Total Nighttime Crashes	1
Nighttime/Daytime Crash Ratio*	1.5

Key Emphasis Areas
Intersections Local Roads

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	\$ 2,500	\$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	\$ 5,000	\$ -
Intersection Configuration Evaluation (ICE)	0	EA	\$ 25,000	\$ -
Implement Results of ICE	0	EA	\$ 750,000	\$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	\$ 5,000	\$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	1	EA	\$ 5,000	\$ 5,000
Install Destination Lighting	0	LEG	\$ 8,000	\$ -
Upgrade Signs and Pavement Markings	4	LEG	\$ 2,200	\$ 8,800
Upgrade Signs (Unpaved Approaches)	0	LEG	\$ 1,000	\$ -
Install Second Stop Sign and Stop Ahead Sign	4	LEG	\$ 1,200	\$ 4,800
Install Solar-Powered Flashing Beacon on Stop Sign	8	EA	\$ 2,500	\$ 20,000
Install Transverse Rumble Strips	3	LEG	\$ 1,000	\$ 3,000
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	4	LEG	\$ 1,200	\$ 4,800
Clear and Grub within Sight Triangle	4	LEG	\$ 1,500	\$ 6,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 52,400

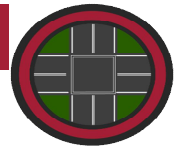
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* Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, OpenStreetMap contributors, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Intersection Improvements****Risk Factor Points: 14**

Project Name: US 169/PARAGON AVE/360TH ST & IA 175 & Co Rd P61
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountytia.org

Date: 9/20/17

Prepared By: DJG/DVM
Checked By: MMO

INTERSECTION**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID:** 704678

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Provide Right-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Realign Intersection Approaches to Reduce or Eliminate Intersection Skew						LEG	\$ 200,000	\$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	\$ 50,000	\$ -
Convert Offset T-Intersection to Four-Legged Intersection						EA	\$ 300,000	\$ -
Use Indirect Left-Turn Treatments to Minimize Conflicts at Divided Highway Intersection						LEG	\$ 75,000	\$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	\$ 300,000	\$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	\$ 2,500	\$ -
Install Stop Signs with LED Flashing Lights						LEG	\$ 2,500	\$ -
Install Retroreflective Strips on Stop Sign Posts						EA	\$ 100	\$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	\$ 15,000	\$ -
Flashing Beacon on Intersection Warning Signs						SIGN	\$ 2,500	\$ -
Other:								
Other:								
Additional Potential Improvements Subtotal:								\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:								\$ 52,400
Subtotal:								\$ 52,400
Mobilization: (% +/-)* 10%								\$ 5,240
Traffic Control: (% +/-) 5%								\$ 2,672
Contingency: (% +/-) 20%								\$ 10,688
Estimated Project Cost								\$ 71,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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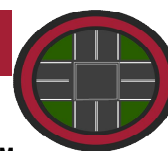
End of Project Description

Back Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 12



Project Name: US 20/235TH ST & Co Rd P51/JOHNSON AVE
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountyia.org

Date: 9/20/17

Prepared By: DJG/DVM
 Checked By: MMO

INTERSECTION

Location Description

Road: US 20/235TH ST

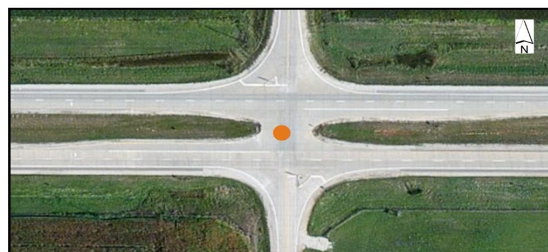
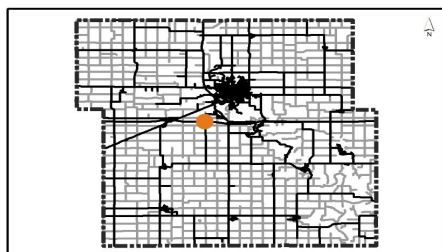
Closest City: FORT DODGE

GPS ID: 562311

Road: Co Rd P51/JOHNSON AVE

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	5.5 mi	4
Approach Angle (Degrees)	90	0
Intersection within Curve	No	0
Daily Entering Vehicles	2,820	3
Minor Street Volume	300	2
Roads/Driveways within 250 Feet	0	0
K or A Crashes	1	2
Number of Approaches	4	1
Total Risk Factor Points (22 max)		12

Other Information	
Number of Approaches	4
Number of Paved Approaches	4
Major ADT	4,520
Minor ADT	300
Destination Lighting	No
Transverse Rumble Strips (Number of Approaches)	2
Control Type	Two-way stop

Crash Data, 2007-2016	
Total Crashes	4
K and A Crashes	1
Right Angle, Rear-end, or Turning Crashes	2
Total Nighttime Crashes	2
Nighttime/Daytime Crash Ratio*	3.0

Key Emphasis Areas
Intersections Local Roads

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	\$ 2,500	\$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	\$ 5,000	\$ -
Intersection Configuration Evaluation (ICE)	0	EA	\$ 25,000	\$ -
Implement Results of ICE	0	EA	\$ 750,000	\$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	\$ 5,000	\$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	\$ 5,000	\$ -
Install Destination Lighting	1	LEG	\$ 8,000	\$ 8,000
Upgrade Signs and Pavement Markings	2	LEG	\$ 2,200	\$ 4,400
Upgrade Signs (Unpaved Approaches)	0	LEG	\$ 1,000	\$ -
Install Second Stop Sign and Stop Ahead Sign	2	LEG	\$ 1,200	\$ 2,400
Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	\$ 2,500	\$ -
Install Transverse Rumble Strips	0	LEG	\$ 1,000	\$ -
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	2	LEG	\$ 1,200	\$ 2,400
Clear and Grub within Sight Triangle	4	LEG	\$ 1,500	\$ 6,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 23,200

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* Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:

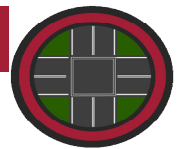
Esri, DeLorme, NAVTEQ, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, OpenStreetMap contributors, and the GIS User Community

Front Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 12



Project Name: US 20/235TH ST & Co Rd P51/JOHNSON AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountytia.org

Date: 9/20/17

Prepared By: DJG/DVM
Checked By: MMO

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 562311

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Provide Right-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Realign Intersection Approaches to Reduce or Eliminate Intersection Skew						LEG	\$ 200,000	\$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	\$ 50,000	\$ -
Convert Offset T-Intersection to Four-Legged Intersection						EA	\$ 300,000	\$ -
Use Indirect Left-Turn Treatments to Minimize Conflicts at Divided Highway Intersection						LEG	\$ 75,000	\$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	\$ 300,000	\$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	\$ 2,500	\$ -
Install Stop Signs with LED Flashing Lights						LEG	\$ 2,500	\$ -
Install Retroreflective Strips on Stop Sign Posts						EA	\$ 100	\$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	\$ 15,000	\$ -
Flashing Beacon on Intersection Warning Signs						SIGN	\$ 2,500	\$ -
Other:								
Other:								
Additional Potential Improvements Subtotal:								\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:								\$ 23,200
Subtotal:								\$ 23,200
Mobilization: (% +/-)* 10%								\$ 2,500
Traffic Control: (% +/-) 5%								\$ 1,260
Contingency: (% +/-) 20%								\$ 5,040
Estimated Project Cost								\$ 32,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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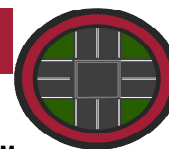
End of Project Description

Back Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 12



Project Name: US 169/LAINSON AVE & Co Rd D43/CO RTE D43/290TH ST
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountyia.org

Date: 9/20/17

Prepared By: DJG/DVM
 Checked By: MMO

INTERSECTION

Location Description

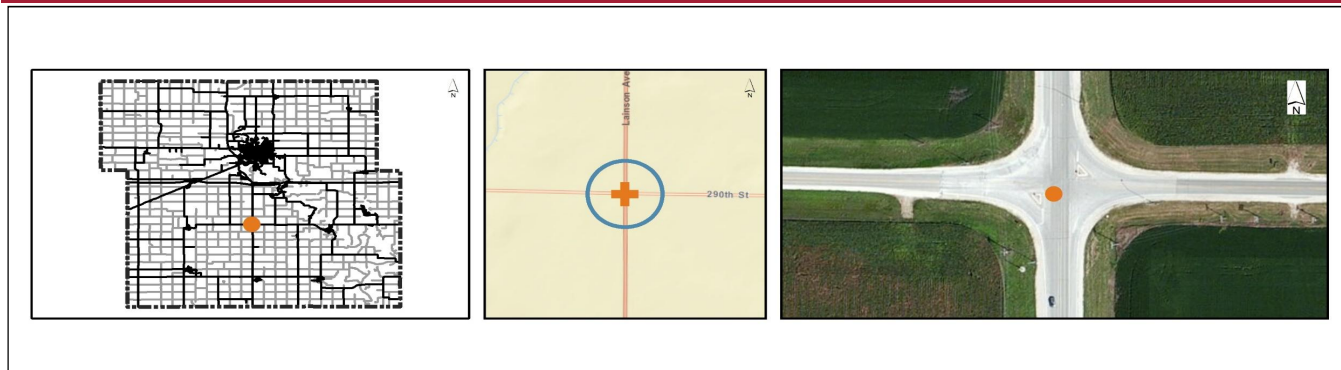
Road: US 169/LAINSON AVE
 Road: Co Rd D43/CO RTE D43/290TH ST

Closest City: OTHO

GPS ID: 562589

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	5 mi	4
Approach Angle (Degrees)	90	0
Intersection within Curve	No	0
Daily Entering Vehicles	3,495	3
Minor Street Volume	550	2
Roads/Driveways within 250 Feet	0	0
K or A Crashes	1	2
Number of Approaches	4	1
Total Risk Factor Points (22 max)		12

Other Information	
Number of Approaches	4
Number of Paved Approaches	4
Major ADT	3,430
Minor ADT	550
Destination Lighting	Yes
Transverse Rumble Strips (Number of Approaches)	2
Control Type	Two-way stop

Crash Data, 2007-2016	
Total Crashes	6
K and A Crashes	1
Right Angle, Rear-end, or Turning Crashes	3
Total Nighttime Crashes	2
Nighttime/Daytime Crash Ratio*	1.5

Key Emphasis Areas
Intersections Local Roads

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	\$ 2,500	\$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	\$ 5,000	\$ -
Intersection Configuration Evaluation (ICE)	0	EA	\$ 25,000	\$ -
Implement Results of ICE	0	EA	\$ 750,000	\$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	\$ 5,000	\$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	\$ 5,000	\$ -
Install Destination Lighting	0	LEG	\$ 8,000	\$ -
Upgrade Signs and Pavement Markings	2	LEG	\$ 2,200	\$ 4,400
Upgrade Signs (Unpaved Approaches)	0	LEG	\$ 1,000	\$ -
Install Second Stop Sign and Stop Ahead Sign	2	LEG	\$ 1,200	\$ 2,400
Install Solar-Powered Flashing Beacon on Stop Sign	4	EA	\$ 2,500	\$ 10,000
Install Transverse Rumble Strips	0	LEG	\$ 1,000	\$ -
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	2	LEG	\$ 1,200	\$ 2,400
Clear and Grub within Sight Triangle	4	LEG	\$ 1,500	\$ 6,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 25,200

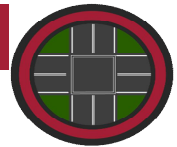
Continued on back of this page.

* Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, OpenStreetMap contributors, and the GIS User Community

Front Page

Local Road Safety Plan**Project Description for Intersection Improvements****Risk Factor Points: 12**

Project Name: US 169/LAINSON AVE & Co Rd D43/CO RTE D43/290TH ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 9/20/17

Prepared By: DJG/DVM
Checked By: MMO

INTERSECTION**Opinion of Probable Cost (Additional Potential Improvements)****GPS ID:** 562589

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Provide Right-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Realign Intersection Approaches to Reduce or Eliminate Intersection Skew						LEG	\$ 200,000	\$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	\$ 50,000	\$ -
Convert Offset T-Intersection to Four-Legged Intersection						EA	\$ 300,000	\$ -
Use Indirect Left-Turn Treatments to Minimize Conflicts at Divided Highway Intersection						LEG	\$ 75,000	\$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	\$ 300,000	\$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	\$ 2,500	\$ -
Install Stop Signs with LED Flashing Lights						LEG	\$ 2,500	\$ -
Install Retroreflective Strips on Stop Sign Posts						EA	\$ 100	\$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	\$ 15,000	\$ -
Flashing Beacon on Intersection Warning Signs						SIGN	\$ 2,500	\$ -
Remove Existing Intersection Lights					2	EA	\$ 5,000	\$ 10,000
Other:								
Additional Potential Improvements Subtotal:								\$ 10,000
Project Selection Decision Tree Systemic Improvements Subtotal:								\$ 25,200
Subtotal:								\$ 35,200
Mobilization: (% +/-)* 10%								\$ 3,520
Traffic Control: (% +/-) 5%								\$ 1,856
Contingency: (% +/-) 20%								\$ 7,424
Estimated Project Cost								\$ 48,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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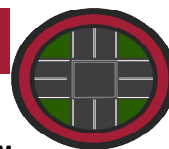
End of Project Description

Back Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 12



Project Name: US 169 & 235TH ST
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountya.org

Date: 9/20/17

Prepared By: DJG/DVM
 Checked By: MMO

INTERSECTION

Location Description

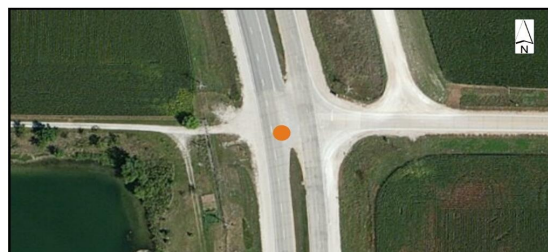
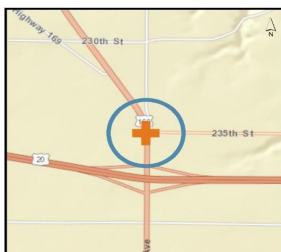
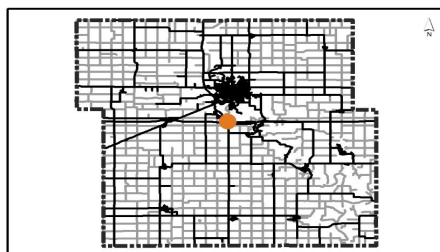
Road: US 169
 Road: 235TH ST

Closest City: FORT DODGE

GPS ID: 562667

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	< 1.5 mi	0
Approach Angle (Degrees)	78	2
Intersection within Curve	Yes	4
Daily Entering Vehicles	6,390	3
Minor Street Volume	200	2
Roads/Driveways within 250 Feet	2	1
K or A Crashes	0	0
Number of Approaches	3	0
Total Risk Factor Points (22 max)		12

Other Information	
Number of Approaches	3
Number of Paved Approaches	3
Major ADT	6,900
Minor ADT	200
Destination Lighting	No
Transverse Rumble Strips (Number of Approaches)	1
Control Type	One-way stop

Crash Data, 2007-2016	
Total Crashes	1
K and A Crashes	0
Right Angle, Rear-end, or Turning Crashes	0
Total Nighttime Crashes	0
Nighttime/Daytime Crash Ratio*	0.0

Key Emphasis Areas
Intersections Local Roads

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	\$ 2,500	\$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	\$ 5,000	\$ -
Intersection Configuration Evaluation (ICE)	0	EA	\$ 25,000	\$ -
Implement Results of ICE	0	EA	\$ 750,000	\$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	\$ 5,000	\$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	\$ 5,000	\$ -
Install Destination Lighting	0	LEG	\$ 8,000	\$ -
Upgrade Signs and Pavement Markings	1	LEG	\$ 2,200	\$ 2,200
Upgrade Signs (Unpaved Approaches)	0	LEG	\$ 1,000	\$ -
Install Second Stop Sign and Stop Ahead Sign	0	LEG	\$ 1,200	\$ -
Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	\$ 2,500	\$ -
Install Transverse Rumble Strips	0	LEG	\$ 1,000	\$ -
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	0	LEG	\$ 1,200	\$ -
Clear and Grub within Sight Triangle	2	LEG	\$ 1,500	\$ 3,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 5,200

Continued on back of this page.

* Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:

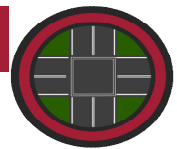
Esri, DeLorme, NAVTEQ, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, OpenStreetMap contributors, and the GIS User Community

Front Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 12



Project Name: US 169 & 235TH ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountya.org

Date: 9/20/17

Prepared By: DJG/DVM
Checked By: MMO

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 562667

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Provide Right-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Realign Intersection Approaches to Reduce or Eliminate Intersection Skew						LEG	\$ 200,000	\$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	\$ 50,000	\$ -
Convert Offset T-Intersection to Four-Legged Intersection						EA	\$ 300,000	\$ -
Use Indirect Left-Turn Treatments to Minimize Conflicts at Divided Highway Intersection						LEG	\$ 75,000	\$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	\$ 300,000	\$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	\$ 2,500	\$ -
Install Stop Signs with LED Flashing Lights						LEG	\$ 2,500	\$ -
Install Retroreflective Strips on Stop Sign Posts						EA	\$ 100	\$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	\$ 15,000	\$ -
Flashing Beacon on Intersection Warning Signs						SIGN	\$ 2,500	\$ -
Other:								
Other:								
Additional Potential Improvements Subtotal:								\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:								\$ 5,200
Subtotal:								\$ 5,200
Mobilization: (% +/-)* 10%								\$ 2,500
Traffic Control: (% +/-) 5%								\$ 260
Contingency: (% +/-) 20%								\$ 1,040
Estimated Project Cost								\$ 9,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

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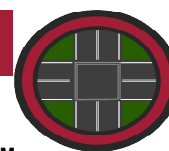
End of Project Description

Back Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 12



Project Name: IA 175/360TH ST & Co Rd P29/BAXTER AVE
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountyia.org

Date: 9/20/17

Prepared By: DJG/DVM
 Checked By: MMO

INTERSECTION

Location Description

Road: IA 175/360TH ST

Closest City: FARNHAMVILLE

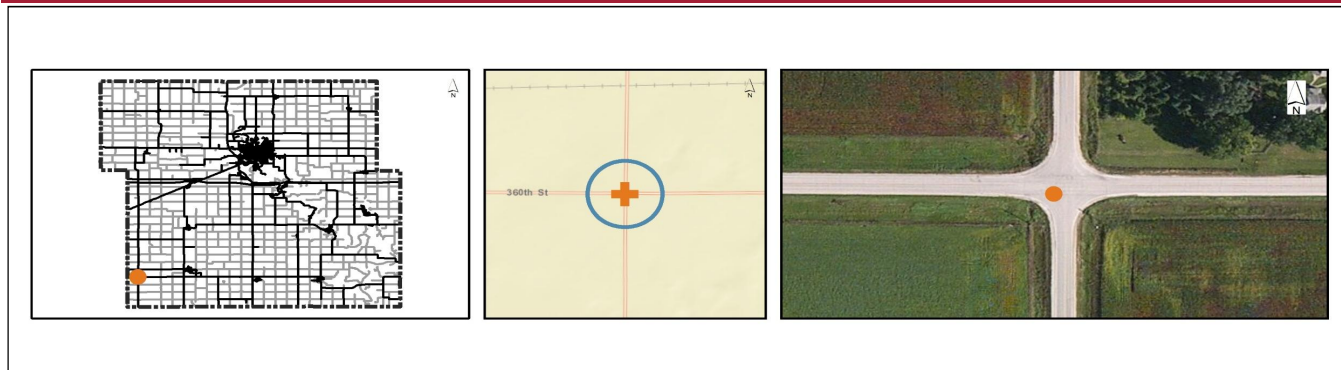
GPS ID: 562967

Road: Co Rd P29/BAXTER AVE

This intersection is located on the following high scoring segment: GPS ID 2826

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	4 mi	4
Approach Angle (Degrees)	90	0
Intersection within Curve	No	0
Daily Entering Vehicles	1,965	3
Minor Street Volume	980	2
Roads/Driveways within 250 Feet	0	0
K or A Crashes	1	2
Number of Approaches	4	1
Total Risk Factor Points (22 max)		12

Other Information	
Number of Approaches	4
Number of Paved Approaches	4
Major ADT	1,260
Minor ADT	980
Destination Lighting	Yes
Transverse Rumble Strips (Number of Approaches)	2
Control Type	Two-way stop

Crash Data, 2007-2016	
Total Crashes	10
K and A Crashes	1
Right Angle, Rear-end, or Turning Crashes	9
Total Nighttime Crashes	0
Nighttime/Daytime Crash Ratio*	0.0

Key Emphasis Areas
Intersections Local Roads

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	\$ 2,500	\$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	\$ 5,000	\$ -
Intersection Configuration Evaluation (ICE)	0	EA	\$ 25,000	\$ -
Implement Results of ICE	0	EA	\$ 750,000	\$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	\$ 5,000	\$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	\$ 5,000	\$ -
Install Destination Lighting	0	LEG	\$ 8,000	\$ -
Upgrade Signs and Pavement Markings	2	LEG	\$ 2,200	\$ 4,400
Upgrade Signs (Unpaved Approaches)	0	LEG	\$ 1,000	\$ -
Install Second Stop Sign and Stop Ahead Sign	2	LEG	\$ 1,200	\$ 2,400
Install Solar-Powered Flashing Beacon on Stop Sign	4	EA	\$ 2,500	\$ 10,000
Install Transverse Rumble Strips	0	LEG	\$ 1,000	\$ -
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	2	LEG	\$ 1,200	\$ 2,400
Clear and Grub within Sight Triangle	4	LEG	\$ 1,500	\$ 6,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 25,200

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* Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:

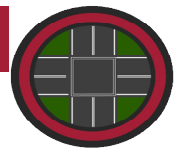
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Front Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 12



Project Name: IA 175/360TH ST & Co Rd P29/BAXTER AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 9/20/17

Prepared By: DJG/DVM
Checked By: MMO

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 562967

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Provide Right-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Realign Intersection Approaches to Reduce or Eliminate Intersection Skew						LEG	\$ 200,000	\$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	\$ 50,000	\$ -
Convert Offset T-Intersection to Four-Legged Intersection						EA	\$ 300,000	\$ -
Use Indirect Left-Turn Treatments to Minimize Conflicts at Divided Highway Intersection						LEG	\$ 75,000	\$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	\$ 300,000	\$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	\$ 2,500	\$ -
Install Stop Signs with LED Flashing Lights						LEG	\$ 2,500	\$ -
Install Retroreflective Strips on Stop Sign Posts						EA	\$ 100	\$ -
Low-Cost Intersection Conflict Warning System (ICWS)					1	EA	\$ 15,000	\$ 15,000
Flashing Beacon on Intersection Warning Signs						SIGN	\$ 2,500	\$ -
Other:								
Other:								
Additional Potential Improvements Subtotal:								\$ 15,000
Project Selection Decision Tree Systemic Improvements Subtotal:								\$ 25,200
Subtotal:								\$ 40,200
Mobilization: (% +/-)* 10%								\$ 4,020
Traffic Control: (% +/-) 5%								\$ 2,156
Contingency: (% +/-) 20%								\$ 8,624
Estimated Project Cost								\$ 55,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

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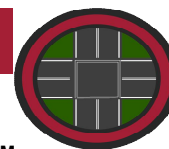
End of Project Description

Back Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 12



Project Name: US 169 & Co Rd C66/140TH ST
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountyia.org

Date: 9/20/17

Prepared By: DJG/DVM
 Checked By: MMO

INTERSECTION

Location Description

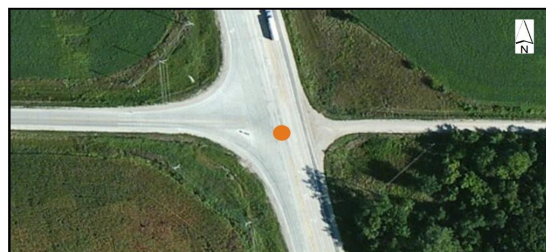
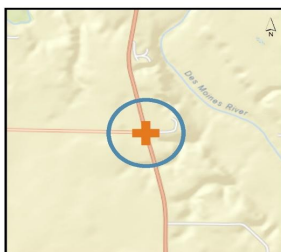
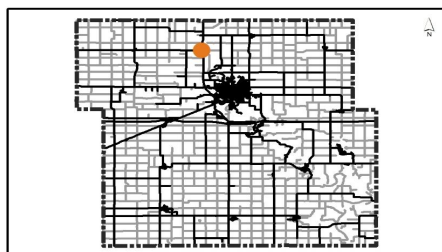
Road: US 169
 Road: Co Rd C66/140TH ST

Closest City: FORT DODGE

GPS ID: 705807

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps



Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	< 1.5 mi	0
Approach Angle (Degrees)	75	2
Intersection within Curve	Yes	4
Daily Entering Vehicles	6,213	3
Minor Street Volume	740	2
Roads/Driveways within 250 Feet	0	0
K or A Crashes	0	0
Number of Approaches	4	1
Total Risk Factor Points (22 max)		12

Other Information	
Number of Approaches	4
Number of Paved Approaches	3
Major ADT	5,300
Minor ADT	740
Destination Lighting	Yes
Transverse Rumble Strips (Number of Approaches)	1
Control Type	Two-way stop

Crash Data, 2007-2016	
Total Crashes	3
K and A Crashes	0
Right Angle, Rear-end, or Turning Crashes	0
Total Nighttime Crashes	1
Nighttime/Daytime Crash Ratio*	3.0

Key Emphasis Areas
Intersections Local Roads

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	\$ 2,500	\$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	\$ 5,000	\$ -
Intersection Configuration Evaluation (ICE)	0	EA	\$ 25,000	\$ -
Implement Results of ICE	0	EA	\$ 750,000	\$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	\$ 5,000	\$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	\$ 5,000	\$ -
Install Destination Lighting	0	LEG	\$ 8,000	\$ -
Upgrade Signs and Pavement Markings	1	LEG	\$ 2,200	\$ 2,200
Upgrade Signs (Unpaved Approaches)	1	LEG	\$ 1,000	\$ 1,000
Install Second Stop Sign and Stop Ahead Sign	1	LEG	\$ 1,200	\$ 1,200
Install Solar-Powered Flashing Beacon on Stop Sign	2	EA	\$ 2,500	\$ 5,000
Install Transverse Rumble Strips	0	LEG	\$ 1,000	\$ -
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	2	LEG	\$ 1,200	\$ 2,400
Clear and Grub within Sight Triangle	4	LEG	\$ 1,500	\$ 6,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 17,800

Continued on back of this page.

* Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:

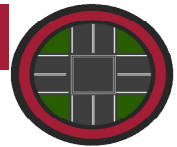
Esri, DeLorme, NAVTEQ, USGS, Intermap, INCREMENT P, NRCA, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, OpenStreetMap contributors, and the GIS User Community

Front Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 12



Project Name: US 169 & Co Rd C66/140TH ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountytia.org

Date: 9/20/17

Prepared By: DJG/DVM
Checked By: MMO

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 705807

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Provide Right-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Realign Intersection Approaches to Reduce or Eliminate Intersection Skew						LEG	\$ 200,000	\$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	\$ 50,000	\$ -
Convert Offset T-Intersection to Four-Legged Intersection						EA	\$ 300,000	\$ -
Use Indirect Left-Turn Treatments to Minimize Conflicts at Divided Highway Intersection						LEG	\$ 75,000	\$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	\$ 300,000	\$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	\$ 2,500	\$ -
Install Stop Signs with LED Flashing Lights						LEG	\$ 2,500	\$ -
Install Retroreflective Strips on Stop Sign Posts						EA	\$ 100	\$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	\$ 15,000	\$ -
Flashing Beacon on Intersection Warning Signs						SIGN	\$ 2,500	\$ -
Other:								
Other:								
Additional Potential Improvements Subtotal:								\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:								\$ 17,800
Subtotal:								\$ 17,800
Mobilization: (% +/-)* 10%								\$ 2,500
Traffic Control: (% +/-) 5%								\$ 940
Contingency: (% +/-) 20%								\$ 3,760
Estimated Project Cost								\$ 25,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

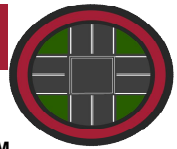
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only Kimley-Horn's judgment as a design professional familiar with the construction industry. Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:

The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. No formal assessment was made for the improvement recommendations contained on this page, if in question, it is recommended that a study/analysis of this location be made to warrant the above indicated improvements. This project description form is based on our knowledge as of September 2017.

End of Project Description

Back Page

Local Road Safety Plan**Project Description for Intersection Improvements****Risk Factor Points: 10**

Project Name: US 20/235TH ST & Co Rd P73/UNION AVE
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountya.org

Date: 1/15/18

Prepared By: DJG/DVM
 Checked By: MMO

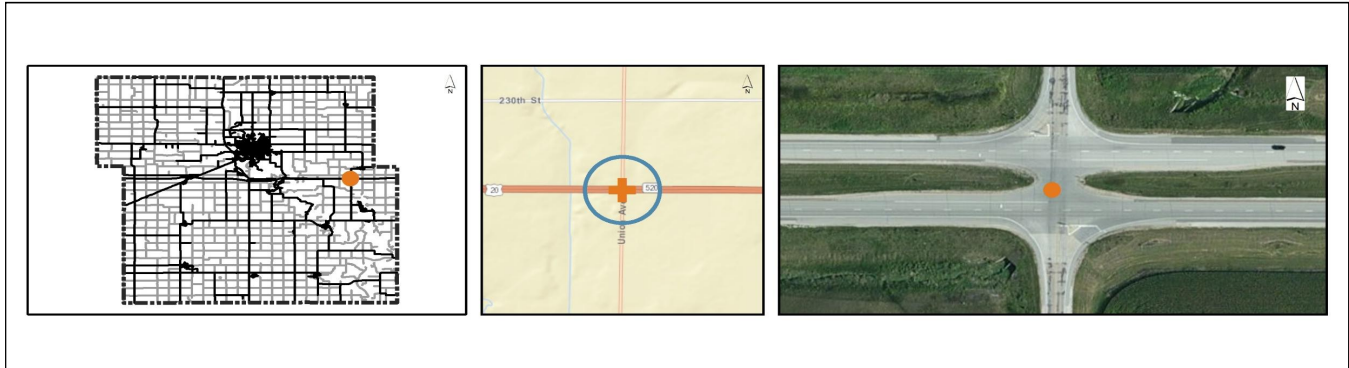
INTERSECTION**Location Description**

Road: US 20/235TH ST
 Road: Co Rd P73/UNION AVE

Closest City: DUNCOMBE

GPS ID: 562457

County to coordinate with local agency to implement improvements that are on right-of-way that is not under control of the County.

Project Location Maps**Intersection Information and Systemic Ranking Summary**

Systemic Ranking Summary	Value	Points
Distance from Previous Stop	5 mi	4
Approach Angle (Degrees)	90	0
Intersection within Curve	No	0
Daily Entering Vehicles	8,055	3
Minor Street Volume	820	2
Roads/Driveways within 250 Feet	0	0
K or A Crashes	0	0
Number of Approaches	4	1
Total Risk Factor Points (22 max)		10

Other Information	
Number of Approaches	4
Number of Paved Approaches	4
Major ADT	9,300
Minor ADT	820
Destination Lighting	No
Transverse Rumble Strips (Number of Approaches)	0
Control Type	Two-way stop

Crash Data, 2007-2016	
Total Crashes	7
K and A Crashes	0
Right Angle, Rear-end, or Turning Crashes	6
Total Nighttime Crashes	0
Nighttime/Daytime Crash Ratio*	0.0

Key Emphasis Areas
Intersections Local Roads

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Coordinate with Local Jurisdiction on Signal Modifications	0	EA	\$ 2,500	\$ -
Signal Warrant Analysis to Consider Removal of Signal	0	EA	\$ 5,000	\$ -
Intersection Configuration Evaluation (ICE)	0	EA	\$ 25,000	\$ -
Implement Results of ICE	0	EA	\$ 750,000	\$ -
All-Way Stop Analysis and Converting Two-Way Stop to All-Way Stop	0	EA	\$ 5,000	\$ -
All-Way Stop Analysis and Removal of Stop Signs on Major Approaches	0	EA	\$ 5,000	\$ -
Install Destination Lighting	1	LEG	\$ 8,000	\$ 8,000
Upgrade Signs and Pavement Markings	2	LEG	\$ 2,200	\$ 4,400
Upgrade Signs (Unpaved Approaches)	0	LEG	\$ 1,000	\$ -
Install Second Stop Sign and Stop Ahead Sign	2	LEG	\$ 1,200	\$ 2,400
Install Solar-Powered Flashing Beacon on Stop Sign	4	EA	\$ 2,500	\$ 10,000
Install Transverse Rumble Strips	2	LEG	\$ 1,000	\$ 2,000
Install Intersection Warning Signs and Advance Street Name Plaques on Major Approaches	2	LEG	\$ 1,200	\$ 2,400
Clear and Grub within Sight Triangle	4	LEG	\$ 1,500	\$ 6,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 35,200

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* Nighttime/Daytime Crash Ratio = 3 x nighttime crashes/daytime crashes per Iowa DOT I.M. 2.110 Attachment A.

Project Location Map Sources:

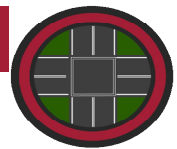
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Front Page

Local Road Safety Plan

Project Description for Intersection Improvements

Risk Factor Points: 10



Project Name: US 20/235TH ST & Co Rd P73/UNION AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 1/15/18

Prepared By: DJG/DVM
Checked By: MMO

INTERSECTION

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 562457

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	NB	SB	EB	WB	Quantity	Unit	Unit Price	Item Cost
Provide Left-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Provide Right-Turn Lanes at Intersection						LEG	\$ 75,000	\$ -
Realign Intersection Approaches to Reduce or Eliminate Intersection Skew						LEG	\$ 200,000	\$ -
Provide Bypass Lane on Shoulder at T-intersection						EA	\$ 50,000	\$ -
Convert Offset T-Intersection to Four-Legged Intersection						EA	\$ 300,000	\$ -
Use Indirect Left-Turn Treatments to Minimize Conflicts at Divided Highway Intersection						LEG	\$ 75,000	\$ -
Convert Four-Legged Intersection to Offset T-Intersection						EA	\$ 300,000	\$ -
Install Solar-Powered Flashing Beacon on Intersection Warning Sign						LEG	\$ 2,500	\$ -
Install Stop Signs with LED Flashing Lights						LEG	\$ 2,500	\$ -
Install Retroreflective Strips on Stop Sign Posts						EA	\$ 100	\$ -
Low-Cost Intersection Conflict Warning System (ICWS)						EA	\$ 15,000	\$ -
Flashing Beacon on Intersection Warning Signs						SIGN	\$ 2,500	\$ -
Other:								
Other:								
Additional Potential Improvements Subtotal:								\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:								\$ 35,200
Subtotal:								\$ 35,200
Mobilization: (% +/-)* 10%								\$ 3,520
Traffic Control: (% +/-) 5%								\$ 1,856
Contingency: (% +/-) 20%								\$ 7,424
Estimated Project Cost								\$ 48,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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End of Project Description

Back Page

APPENDIX C3

INTERSECTION RISK FACTOR RANKING RESULTS



GPS ID	Paved Road	Intersecting Road	Risk Factor Points	Distance from Previous STOP (Value)	Distance from Previous STOP (Points)	Approach Angle (Value)	Approach Angle (Points)	Intersection within Curve (Value)	Intersection within Curve (Points)	Daily Entering Vehicles (Value)	Daily Entering Vehicles (Points)	Minor Street Volume (Value)	Minor Street Volume (Points)	Distance from Driveway or Intersection (Value)	Distance from Driveway or Intersection (Points)	K or A Crash (Value)	K or A Crash (Points)	Number of Approaches (Value)	Number of Approaches (Points)	Total Crashes	K and A	Right angle, rear-end, or turning crashes	Major ADT	Minor ADT	Destination Lighting	Transverse Rumble Strips (Number of Approaches)	Control Type
563547	Co Rd D43/CO RTE D43/290TH ST	Co Rd P61/PARAGON AVE	18	7 mi	4	65	4	1	4	1,440	3	530	2	1	1	0	0	3	0	2	0	1	1,010	530	Yes	1	One-way stop
563478	Co Rd D46/290TH ST	Co Rd P6D/SAMSON AVE & E HILL ST & DIAM	16	6 mi	4	27	4	0	0	1,130	2	370	2	2	1	1	2	4	1	3	1	1	1,070	370	Yes	1	Two-way stop
564811	FRONT ST	HOOD ST	16	5 mi	4	50	4	0	0	1,325	3	560	2	6	2	0	0	4	1	1	0	1	750	560	Yes	1	All-way stop
564089	Co Rd D20/XAVIER AVE	SIMPSON ST	15	< 1.5 mi	0	40	4	2	4	2,640	3	900	2	3	2	0	0	3	0	4	0	0	2,140	900	No	0	One-way stop
564105	Co Rd D14/170TH ST	NATIONAL AVE	15	< 1.5 mi	0	67	4	1	4	2,460	3	500	2	0	0	1	2	3	0	3	1	0	2,700	500	Yes	0	One-way stop
564208	Co Rd D14/170TH ST	MADISON AVE	15	< 1.5 mi	0	55	4	1	4	2,750	3	590	2	1	1	0	0	4	1	5	0	3	3,200	590	Yes	0	Two-way stop
704672	US 169/360TH ST/LAINSON AVE	IA 175 & Co Rd P46	15	7 mi	4	90	0	1	4	2,770	3	1,560	2	1	1	0	0	4	1	17	0	13	2,070	1,560	Yes	1	All-way stop
562267	US 20	Co Rd P29/BAXTER AVE	14	4.5 mi	4	58	4	0	0	2,245	3	930	2	0	0	0	0	4	1	5	0	3	1,610	930	No	2	Two-way stop
563495	Co Rd D46/290TH ST	BRUSHY CREEK RD & BRUSHY CREEK ST RE	14	3.5 mi	4	90	0	1	4	445	1	180	2	1	1	1	2	3	0	1	1	0	410	180	No	0	One-way stop
563774	Co Rd P59/NELSON AVE	239TH AVE & COATS DR	14	< 1.5 mi	0	45	4	1	4	3,580	3	25	0	6	2	0	0	4	1	2	0	1	2,190	25	No	0	One-way stop
564091	Co Rd D20/XAVIER AVE/220TH ST		0	14	< 1.5 mi	0	24	4	1	3,385	3	920	2	1	1	0	0	3	0	1	0	1	2,160	920	No	0	One-way stop
569654	Co Rd D20/XAVIER AVE/200TH ST		0	14	< 1.5 mi	0	30	4	2	1,935	3	50	1	0	0	1	2	3	0	3	1	0	2,140	50	No	0	One-way stop
704678	US 169/PARAGON AVE/360TH ST	IA 175 & Co Rd P61	14	7 mi	4	90	0	5	4	2,740	3	1,080	2	0	0	0	0	4	1	3	0	2	1,770	1,080	Yes	1	All-way stop
704736	US 20/NE RAMP CURV/NW RAMP CURV	Co Rd P59/QUAIL AVE	14	< 1.5 mi	0	59	4	2	4	7,360	3	1,420	2	0	0	0	0	4	1	13	0	12	7,000	1,420	Yes	0	One-way stop
563780	Co Rd P59/QUAIL AVE	Co Rd P6D/235TH ST	13	< 1.5 mi	0	70	2	1	4	3,075	3	560	2	6	2	0	0	3	0	1	0	1	3,360	560	No	0	One-way stop
563826	RIVERSIDE TRL	OTHO DR	13	< 1.5 mi	0	60	4	1	4	820	2	200	2	2	1	0	0	3	0	0	0	0	770	200	No	0	One-way stop
563901	OLD HWY 69	KANSAS AVE	13	< 1.5 mi	0	35	4	3	4	510	1	270	2	3	2	0	0	3	0	1	0	0	670	270	No	0	One-way stop
564096	Co Rd D14/170TH ST	Co Rd P59/PARAGON AVE	13	6 mi	4	90	0	0	0	4,085	3	2,160	2	2	1	2	2	4	1	20	2	12	4,200	2,160	No	0	Two-way stop
562287	US 20	CO RD P33 & GRAND ST	12	< 1.5 mi	0	52	4	0	0	3,730	3	260	2	4	2	0	0	4	1	3	0	2	3,030	260	Yes	0	Two-way stop
562311	US 20/235TH ST	Co Rd P51/JOHNSON AVE	12	5.5 mi	4	90	0	0	0	2,820	3	300	2	0	0	1	2	4	1	4	1	2	4,520	300	No	2	Two-way stop
562589	US 169/LAINSON AVE	Co Rd D43/CO RTE D43/290TH ST	12	5 mi	4	90	0	0	0	3,495	3	550	2	0	0	1	2	4	1	6	1	3	3,430	550	Yes	2	Two-way stop
562667	US 169	235TH ST	12	< 1.5 mi	0	78	2	2	4	6,390	3	200	2	2	1	0	0	3	0	1	0	0	6,900	200	No	1	One-way stop
562769	US 169	IA 7/190TH ST & 3RD AVE NW	12	< 1.5 mi	0	90	0	2	4	9,990	3	5,300	2	0	0	1	2	4	1	61	1	53	7,900	5,300	Yes	0	All-way stop
562937	Co Rd D43/OLD HWY 50	RACINE AVE	12	< 1.5 mi	0	60	4	1	4	770	2	40	1	0	0	0	0	4	1	0	0	0	740	40	No	0	Two-way stop
562967	IA 175/360TH ST	Co Rd P29/BAXTER AVE	12	4 mi	4	90	0	0	0	1,965	3	980	2	0	0	1	2	4	1	10	1	9	1,260	980	Yes	2	Two-way stop
563654	Co Rd D46/310TH ST	Co Rd P29/BAXTER AVE	12	4 mi	4	90	0	0	0	1,260	2	250	2	2	1	1	2	4	1	4	1	3	1,110	250	No	2	Two-way stop
563772	Co Rd P59/NELSON AVE	239TH AVE & COATS DR	12	< 1.5 mi	0	90	0	1	4	3,580	3	2,190	2	7	2	0	0	4	1	2	0	1	2,560	2,190	No	0	One-way stop
563798	Co Rd P59/NELSON AVE	BOIES ST & 239TH AVE	12	< 1.5 mi	0	90	0	1	4	2,510	3	200	2	7	2	0	0	4	1	8	0	4	2,560	200	No	0	One-way stop
563832	Co Rd P59/NELSON AVE	ELM ST	12	< 1.5 mi	0	71	2	1	4	1,615	3	50	1	4	2	0	0	3	0	0	0	0	1,610	50	Yes	0	One-way stop
563833	Co Rd P59/NELSON AVE	RIVERSIDE TRL & 238TH ST	12	< 1.5 mi	0	90	0	1	4	1,735	3	650	2	4	2	0	0	5	1	0	0	0	1,610	650	Yes	0	Two-way stop
563895	Co Rd P51/225TH ST	OLD HWY 69	12	< 1.5 mi	0	72	2	2	4	985	2	410	2	6	2	0	0	3	0	1	0	0	960	410	Yes	0	One-way stop
564024	Co Rd D14/170TH ST	Co Rd P71/VINCENT AVE	12	6 mi	4	90	0	0	0	1,325	3	620	2	0	0	1	2	4	1	1	1	1	1,310	620	No	0	Two-way stop
564040	Co Rd D18/190TH ST	Co Rd P71/VINCENT AVE	12	6 mi	4	90	0	0	0	1,865	3	1,040	2	0	0	4	2	4	1	9	4	7	1,140	1,040	Yes	2	Two-way stop
564042	Co Rd D18/190TH ST	Co Rd P63/SAMSON AVE	12	2 mi	4	90	0	0	0	1,480	3	480	2	0	0	1	2	4	1	4	1	3	1,220	480	No	2	Two-way stop
564058	Co Rd D20/200TH ST	Co Rd P71/VINCENT AVE	12	6 mi	4	90	0	0	0	2,510	3	1,140	2	4	1	2	2	3	0	4	1	2	2,620	1,140	Yes	0	One-way stop
564090	Co Rd D20/XAVIER AVE	SIMPSON ST & 220TH ST	12	< 1.5 mi	0	90	0	2	4	4,645	3	920	2	4	2	0	0	5	1	2	0	1	1,270	920	Yes	0	Yield sign
564133	MADISON AVE	JOHNSON AVE	0	12	< 1.5 mi	0	27	4	1	1,020	2	250	2	0	0	0	0	3	0	0	0	0	890	250	No	0	One-way stop
564264	Co Rd D22/PARKER DR	JOHNSON AVE	12	< 1.5 mi	0	62	4	1	4	1,030	2	60	1	1	0	0	0	3	0	1	0	0	1,130	60	No	0	One-way stop
569364	KANSAS AVE	SHERRI LN	12	< 1.5 mi	0	51	4	1	4	345	0	200	2	4	2	0	0	3	0	0	0	0	270	200	No	0	One-way stop
704895	SIMPSON ST	EAGLE ST	12	< 1.5 mi	0	90	0	1	4	1,725	3	289	2	4	2	1	0	4	1	1	0	1	1,270	289	Yes	0	One-way stop
705807	US 169	Co Rd C66/140TH ST	12	< 1.5 mi	0	75	2	1	4	6,213	3	740	2	0	0	0	0	4	1	3	0	0	5,300	740	Yes	1	Two-way stop
562859	IA 7/190TH ST	Co Rd P29/DAKOTA AVE	11	4 mi	4	90	0	0	0	3,080	3	650	2	1	1	0	0	4	1	3	0	1	2,810	650	No	1	Two-way stop
562891	IA 7/190TH ST	Co Rd P41/JOHNSON AVE	11	4.5 mi	4	90	0	0	0	4,165	3	510	2	0	0	1	2	3	0	3	1	2	5,300	510	Yes	0	One-way stop
562917	Co Rd D43/CO RTE D43	Co Rd P59/NELSON AVE	11	3.5 mi	4	90	0	0	0	1,265	2	550	2	0	0	1	2	4	1	2	1	0	1,010	550	Yes	0	Two-way stop
563279	Co Rd D46/290TH ST	BRUSHY CREEK RD & BRUSHY CREEK ST RE	11	< 1.5 mi	0	90	0	1	4	445	1	350	2	1	1	1	2	4	1	1	1	0	410	350	No	0	One-way stop
563730	Co Rd P73/UNION AVE	270TH ST	11	3.5 mi	4	90	0	0	0	645	1	330	2	1	1	1	2	4	1	1	1	1	820	330	No	0	Two-way stop
563745	Co Rd P59/QUAIL AVE		0	11	< 1.5 mi	0	43	4	1	7,105	3	10	0	0	0	0	0	3	0	5	0	0	7,000	10	No	0	One-way stop
563768	Co Rd P59/NELSON AVE	1ST ST & 239TH AVE & COATS DR & HOYT S	11	< 1.5 mi	0	90	0	2	4	3,830	3	150	1	5	2	0	0	6	1	0	0	0	2,560	150	No	0	One-way stop
563828	Co Rd P59/NELSON AVE	ELM DR	11	< 1.5 mi	0	90	0	1	4	2,045	3	600	2	4	2	0	0	3	0	2	0	0	2,190	600	Yes	0	One-way stop
563908	Co Rd D20/OLD HWY 20	HAYES AVE	11	< 1.5 mi	0	60	4	0	0	3,230	3	90	1	0	0	1	2	4	1	1	1	1	3,860	90	No	0	Two-way stop
564110	NATIONAL AVE		0	11	< 1.5 mi	0	51	4	1	470	1	240	2	0	0	0	0	3	0	1	0	0	740	240	No	0	One-way stop
564251	180TH ST	MADISON AVE	11	< 1.5 mi	0	28	4	1	4	980	2	160	1	0	0	0	0	3	0	2	0	0	790	160	No	0	One-way stop
564390	Co Rd C56/VINCENT AVE/140TH ST	Co Rd P71	11	2.5 mi	4	90	0	0	0	1,605	3	970	2	1	1	0	0	4	1	0	0	0	1,310	970	No	0	Two-way stop
564420	Co Rd P59/PARAGON AVE	110TH ST	11	< 1.5 mi	0	75	2	1	4	1,125	2	60	1	1	1	0	0	4	1	2	0	0	840	60	No	0	Two-way stop
567858	E HILL ST	RIVER ST & PLEASANT ST	11	< 1.5 mi	0	30	4	0	0	965	2	290	2	4	2	0	0	4	1	5	0	1	1,230	290	Yes	0	Two-way stop
569658	Co Rd D20/200TH ST		0	11	< 1.5 mi	0	30	4	3	1,910	3	20	0	0	0	0	0	3	0	7	0	0	2,140	20	No	0	One-way stop
569747	GYPSUM HOLLOW RD	PATTERSON FIELD RD	11	< 1.5 mi	0	90	0	1	4	1,350																	



GPS ID	Paved Road	Intersecting Road	Risk Factor Points	Distance from Previous STOP (Value)	Distance from Previous STOP (Points)	Approach Angle (Value)	Approach Angle (Points)	Intersection within Curve (Value)	Intersection within Curve (Points)	Daily Entering Vehicles (Value)	Daily Entering Vehicles (Points)	Minor Street Volume (Value)	Minor Street Volume (Points)	Distance from Driveway or Intersection (Value)	Distance from Driveway or Intersection (Points)	K or A Crash (Value)	K or A Crash (Points)	Number of Approaches (Value)	Number of Approaches (Points)	Total Crashes	K and A	Right angle, rear-end, or turning crashes	Major ADT	Minor ADT	Destination Lighting	Transverse Rumble Strips (Number of Approaches)	Control Type	
704692	IA 175/IOWA 175	Co Rd D64/WASHINGTON AVE	9	< 1.5 mi	0	15	2	2	4	740	2	90	1	0	0	0	0	3	0	0	0	0	800	90	No	0	One-way stop	
705787	1ST ST	BREWSTER ST	9	< 1.5 mi	0	70	2	0	0	1,621	3	981	2	6	2	0	0	3	0	0	0	1,180	981	No	0	One-way stop		
218150	Co Rd D64/RIVER WAY	Co Rd R21/CHASE AVE	8	< 1.5 mi	0	15	2	1	4	505	1	120	1	0	0	0	0	3	0	1	0	0	390	120	No	0	One-way stop	
562623	US 169/LAINSON AVE	Co Rd D33/250TH ST	8	< 1.5 mi	0	90	0	0	0	4,030	3	790	2	3	2	0	0	4	1	1	0	0	4,280	790	Yes	0	Two-way stop	
562785	US 169	Co Rd D14/170TH ST	8	< 1.5 mi	0	90	0	0	0	7,050	3	2,680	2	0	0	2	2	4	1	9	2	7	5,720	2,680	Yes	1	Two-way stop	
562831	US 169	Co Rd C56/115TH ST	8	5.5 mi	4	90	0	0	0	6,370	3	140	1	0	0	0	0	3	0	0	0	6,000	140	No	1	One-way stop		
562927	Co Rd D43/290TH ST/CO RTE D43	PARAGON AVE	8	< 1.5 mi	0	90	0	1	4	820	2	60	1	1	1	0	0	3	0	3	0	530	60	No	0	One-way stop		
562955	IA 144/INDIANA AVE	Co Rd D68/390TH ST	8	3 mi	4	90	0	0	0	745	2	160	1	0	0	0	0	4	1	0	0	580	160	No	0	Two-way stop		
563318	Co Rd D54/340TH ST	0	8	< 1.5 mi	0	32	4	3	4	260	0	20	0	0	0	0	0	3	0	0	1	0	0	200	20	No	0	One-way stop
563327	Co Rd D64/RIVER WAY	XAVIER AVE	8	< 1.5 mi	0	32	4	2	4	165	0	15	0	0	0	0	0	3	0	0	0	150	15	No	0	One-way stop		
563328	Co Rd D64/RIVER WAY	XAVIER AVE	8	< 1.5 mi	0	25	4	2	4	165	0	15	0	0	0	0	0	3	0	0	1	0	0	150	15	No	0	One-way stop
563329	Co Rd D64/RIVER WAY	XAVIER AVE	8	< 1.5 mi	0	33	4	2	4	165	0	10	0	0	0	0	0	3	0	0	1	0	0	150	10	No	0	One-way stop
563332	Co Rd D64/WASHINGTON AVE	0	8	< 1.5 mi	0	30	4	2	4	170	0	25	0	0	0	0	0	3	0	0	0	150	25	No	0	One-way stop		
563333	Co Rd D64/WASHINGTON AVE	Co Rd D65/RIVER WAY	8	< 1.5 mi	0	30	4	2	4	170	0	25	0	0	0	0	0	3	0	0	0	150	25	No	0	One-way stop		
563335	Co Rd D64/RIVER WAY	Co Rd D65 & XAVIER AVE	8	< 1.5 mi	0	30	4	3	4	165	0	10	0	0	0	0	0	3	0	0	0	150	10	No	0	One-way stop		
563422	Co Rd D60/350TH ST	Co Rd P33/FAIRBANKS AVE & MAIN ST & CO R	8	< 1.5 mi	0	90	0	0	0	2,125	3	1,220	2	4	2	0	0	4	1	5	0	4	1,360	1,220	Yes	0	Two-way stop	
563628	Co Rd P33/280TH ST/FAIRBANKS AVE	0	8	< 1.5 mi	0	25	4	0	0	933	2	25	0	4	2	0	0	3	0	4	0	0	950	25	No	0	One-way stop	
563890	THEATER RD	OLD HWY 69	8	< 1.5 mi	0	90	0	1	4	1,410	3	140	1	0	0	0	0	3	0	0	0	2,240	140	Yes	0	One-way stop		
563892	Co Rd P51/225TH ST/JOHNSON AVE	0	8	< 1.5 mi	0	29	4	3	4	253	0	5	0	0	0	0	0	3	0	0	1	0	0	250	5	No	0	One-way stop
563893	Co Rd P51/JOHNSON AVE	0	8	< 1.5 mi	0	30	4	3	4	253	0	5	0	0	0	0	0	3	0	0	0	250	5	No	0	One-way stop		
563952	Co Rd D26/230TH ST	Co Rd P29/BAXTER AVE	8	4.5 mi	4	90	0	0	0	645	1	290	2	0	0	0	0	4	1	1	0	1	570	290	No	4	One-way stop	
564240	MADISON AVE	RIVER DALE DR	8	< 1.5 mi	0	90	0	1	4	655	1	90	1	3	2	0	0	3	0	1	0	1	640	90	No	0	One-way stop	
564455	Co Rd C56/120TH ST	Co Rd P53/NATIONAL AVE	8	4 mi	4	90	0	0	0	2,215	3	170	1	0	0	0	0	3	0	0	0	2,320	170	Yes	0	One-way stop		
564466	Co Rd P59/PARAGON AVE	140TH ST	8	< 1.5 mi	0	90	0	1	4	2,120	3	30	0	0	0	0	0	4	1	2	0	2,160	30	No	0	Two-way stop		
564470	Co Rd P56/NELSON AVE	140TH ST	8	< 1.5 mi	0	58	4	0	0	2,340	3	60	1	0	0	0	0	3	0	0	4	0	1	2,160	60	No	0	One-way stop
564485	Co Rd C56/110TH ST	Co Rd P33	8	< 1.5 mi	0	43	4	3	4	145	0	5	0	0	0	0	0	3	0	0	0	140	5	No	0	One-way stop		
564489	Co Rd C56/110TH ST/INDIANA AVE	0	8	< 1.5 mi	0	22	4	3	4	145	0	10	0	0	0	0	0	3	0	0	0	140	10	No	0	One-way stop		
564492	Co Rd C56/INDIANA AVE/115TH ST	0	8	< 1.5 mi	0	28	4	2	4	148	0	10	0	0	0	0	0	3	0	0	0	140	10	No	0	One-way stop		
564494	Co Rd C56/115TH ST	0	8	< 1.5 mi	0	24	4	2	4	148	0	15	0	0	0	0	0	3	0	0	0	140	15	No	0	One-way stop		
564542	Co Rd C56/110TH ST	Co Rd P29/FAIRBANKS AVE	8	5.5 mi	4	90	0	0	0	508	1	140	1	1	1	0	0	4	1	0	0	430	140	Yes	1	Two-way stop		
564737	THOMAS ST	MORTIMER ST	8	< 1.5 mi	0	90	0	0	0	1,725	3	920	2	8	2	0	0	4	1	1	0	1	1,350	920	Yes	0	All-way stop	
569379	OLD HWY 69	230TH ST	8	< 1.5 mi	0	40	4	0	0	380	0	180	2	2	1	0	0	4	1	1	0	1	280	180	No	0	Two-way stop	
704709	DOLLIVER PARK AVE	0	8	< 1.5 mi	0	55	4	1	4	240	0	0	0	0	0	0	0	3	0	0	1	0	0	280	0	No	0	Uncontrolled
704740	Co Rd D33/250TH ST	RAILROAD ST	8	< 1.5 mi	0	78	2	0	0	935	2	289	2	3	2	0	0	3	0	0	1	0	1	790	289	Yes	0	One-way stop
704890	SIMPSON ST	PRINCE ST	8	< 1.5 mi	0	90	0	0	0	1,479	3	289	2	8	2	0	0	4	1	0	0	0	1,270	289	Yes	0	Two-way stop	
704892	SIMPSON ST	CEDAR ST	8	< 1.5 mi	0	90	0	0	0	1,479	3	289	2	5	2	0	0	4	1	0	0	0	1,270	289	Yes	0	Two-way stop	
704894	SIMPSON ST	EAGLE ST	8	< 1.5 mi	0	90	0	0	0	1,725	3	289	2	5	2	0	0	4	1	1	0	1	1,270	289	Yes	0	One-way stop	
705782	1ST ST	MARSHALL ST	8	< 1.5 mi	0	90	0	0	0	1,439	3	389	2	7	2	0	0	4	1	0	0	0	1,180	389	Yes	0	All-way stop	
705785	1ST ST	ARTHUR ST	8	< 1.5 mi	0	90	0	0	0	1,696	3	981	2	9	2	0	0	4	1	0	0	0	1,180	981	Yes	0	One-way stop	
562696	US 169	THEATER RD	7	< 1.5 mi	0	90	0	0	0	8,190	3	2,240	2	0	0	1	2	3	0	9	1	3	8,400	2,240	No	0	One-way stop	
562705	US 169	21ST AVE S	7	< 1.5 mi	0	90	0	0	0	8,750	3	500	2	3	2	0	0	3	0	3	0	2	8,400	500	No	0	One-way stop	
562861	IA 7/190TH ST	EASTERN AVE	7	< 1.5 mi	0	90	0	0	0	3,560	3	490	2	2	1	0	0	4	1	2	0	0	3,310	490	No	0	Two-way stop	
562939	HWY 50	TAYLOR RD	7	< 1.5 mi	0	90	0	0	0	1,074	2	289	2	3	2	0	0	4	1	2	0	1	740	289	Yes	0	Two-way stop	
562950	MAIN ST	MILL ST	7	< 1.5 mi	0	90	0	0	0	924	2	289	2	14	2	0	0	4	1	1	0	0	1,000	289	Yes	0	Two-way stop	
563396	Co Rd D68/390TH ST	Co Rd P46/LAINSON AVE	7	3 mi	4	90	0	0	0	630	1	160	1	0	0	0	0	4	1	1	0	0	620	160	No	0	Two-way stop	
563630	Co Rd P33/FAIRBANKS AVE	0	7	< 1.5 mi	0	35	4	0	0	933	2	25	0	2	1	0	0	3	0	0	2	0	950	25	No	0	One-way stop	
563951	Co Rd P29/BAXTER AVE	0	7	< 1.5 mi	0	15	2	1	4	425	1	10	0	0	0	0	0	3	0	0	0	0	570	10	No	0	One-way stop	
564046	Co Rd D20/200TH ST	Co Rd P63/SAMSON AVE	7	1 mi	0	90	0	0	0	2,890	3	480	2	2	1	0	0	4	1	3	0	0	3,650	480	Yes	1	Two-way stop	
564315	Co Rd P29/FAIRBANKS AVE	160TH ST	7	< 1.5 mi	0	90	0	1	4	623	1	40	1	2	1	0	0	3	0	1	0	0	560	40	No	0	One-way stop	
564739	THOMAS ST	MARGARET AVE	7	< 1.5 mi	0	90	0	0	0	1,289	2	289	2	12	2	0	0	4	1	0	0	0	1,050	289	Yes	0	Two-way stop	
564742	THOMAS ST	AGNES AVE	7	< 1.5 mi	0	90	0	0	0	1,225	2	360	2	14	2	0	0	4	1	3	0	2	1,050	360	Yes	0	Two-way stop	
564809	FRONT ST	YETMAR ST	7	< 1.5 mi	0	90	0	0	0	899	2	289	2	9	2	0	0	4	1	1	0	0	710	289	Yes	0	Two-way stop	
565099	WALNUT ST	SIMPSON ST	7	< 1.5 mi	0	90	0	0	0	1,165	2	350	2	9	2	0	0	4	1	0	0	0	1,270	350	Yes	0	All-way stop	
566982	19TH AVE S	S 15TH ST	7	< 1.5 mi	0	90	0	0	0	495	1	250	2	8	2	1	2	3	0	2	1	0	470	250	No	0	One-way stop	
568594	Co Rd P6D/SAMSON AVE	280TH ST	7	< 1.5 mi	0	90	0	1	4	385	0	50	1	0	0	1	2	3	0	1	1	0	370	50	No	0	One-way stop	
569758	S 12TH ST	22ND AVE S	7	< 1.5 mi	0	90	0	1	4	275	0	40	1	3	2	0	0	3	0	0	0	0	190	40	No	0	One-way stop	
704784	THOMAS ST	PANTHER AVE	7	< 1.5 mi	0	90	0	0	0	1,465	3	289	2	7	2	0	0	3	0	1	0	0	1,350	289	Yes	0	One-way stop	
704785	THOMAS ST	PARK AVE	7	< 1.5 mi	0	90	0	0	0	1,465	3	289	2	4	2	0	0	3	0	2	0	1	1,350	289	Yes	0	One-way stop	
704792	MORTIMER ST	JAMES ST	7	< 1.5 mi	0	90	0	0	0	1,209	2	289	2	8	2	0	0											



GPS ID	Paved Road	Intersecting Road	Risk Factor Points	Distance from Previous STOP (Value)	Distance from Previous STOP (Points)	Approach Angle (Value)	Approach Angle (Points)	Intersection within Curve (Value)	Intersection within Curve (Points)	Daily Entering Vehicles (Value)	Daily Entering Vehicles (Points)	Minor Street Volume (Value)	Minor Street Volume (Points)	Distance from Driveway or Intersection (Value)	Distance from Driveway or Intersection (Points)	K or A Crash (Value)	K or A Crash (Points)	Number of Approaches (Value)	Number of Approaches (Points)	Total Crashes	K and A	Right angle, rear-end, or turning crashes	Major ADT	Minor ADT	Destination Lighting	Transverse Rumble Strips (Number of Approaches)	Control Type
705727	CO RD	CLAYWORKS DR	6	< 1.5 mi	0	50	4	0	0	736	1	152	1	0	0	0	0	3	0	0	0	0	630	152	No	0	One-way stop
705788	1ST ST	JOHNSON ST	6	< 1.5 mi	0	90	0	0	0	1,275	2	289	2	4	2	0	0	3	0	0	0	0	1,180	289	No	0	Two-way stop
705798	350TH ST	1ST ST	6	< 1.5 mi	0	90	0	0	0	905	2	289	2	6	2	0	0	3	0	0	0	0	760	289	Yes	0	Yield sign
705799	350TH ST	2ND ST	6	< 1.5 mi	0	90	0	0	0	905	2	289	2	5	2	0	0	3	0	0	0	0	760	289	No	0	Uncontrolled
705800	350TH ST	3RD ST	6	< 1.5 mi	0	90	0	0	0	905	2	289	2	5	2	0	0	3	0	0	0	0	760	289	Yes	0	Yield sign
562579	US 169/LAINSON AVE	320TH ST	5	< 1.5 mi	0	90	0	0	0	2,630	3	110	1	0	0	0	0	4	1	2	0	1	2,900	110	No	0	Two-way stop
562929	Co Rd D43/CO RTE D43	QUAIL AVE	5	< 1.5 mi	0	90	0	0	0	730	1	280	2	1	1	0	0	4	1	1	0	0	640	280	Yes	0	Two-way stop
563186	DOLLIVER PARK AVE	DOLLIVER MEMORIAL	5	< 1.5 mi	0	90	0	1	4	240	0	0	0	2	1	0	0	3	0	0	0	0	280	0	No	0	Uncontrolled
563358	RACINE AVE	375TH ST	5	< 1.5 mi	0	90	0	2	4	195	0	70	1	0	0	0	0	3	0	0	0	0	180	70	No	0	One-way stop
563418	Co Rd P33/FAIRBANKS AVE	340TH ST	5	< 1.5 mi	0	90	0	0	0	1,353	3	40	1	0	0	0	0	4	1	0	0	0	1,360	40	No	0	Two-way stop
563489	Co Rd D46/290TH ST	VASSE AVE	5	< 1.5 mi	0	67	4	0	0	405	1	10	0	0	0	0	0	3	0	0	0	0	410	10	No	0	One-way stop
563556	Co Rd P61/PARAGON AVE	306TH ST	5	< 1.5 mi	0	90	0	0	0	885	2	90	1	5	2	0	0	3	0	0	0	0	780	90	No	0	One-way stop
563558	Co Rd P61/PARAGON AVE	307TH ST	5	< 1.5 mi	0	90	0	0	0	910	2	140	1	5	2	0	0	3	0	0	0	0	780	140	No	0	One-way stop
563638	Co Rd P29/BAXTER AVE	300TH ST	5	< 1.5 mi	0	90	0	0	0	1,025	2	40	1	1	1	0	0	4	1	1	0	0	1,110	40	No	0	Two-way stop
563761	235TH ST	MALLINGER DR	5	< 1.5 mi	0	90	0	1	4	225	0	90	1	0	0	0	0	3	0	0	0	0	200	90	No	0	One-way stop
563794	Co Rd P59/NELSON AVE	DOLLIVER	5	< 1.5 mi	0	90	0	0	0	2,395	3	25	0	11	2	0	0	3	0	1	0	0	2,560	25	No	0	One-way stop
563820	Co Rd P6D/SWALLOW AVE/250TH ST	245TH ST & SPIKE AVE	5	< 1.5 mi	0	90	0	0	0	510	1	150	1	4	2	0	0	5	1	0	0	0	560	150	No	0	Two-way stop
563824	RIVERSIDE TRL	MINING BLVD	5	< 1.5 mi	0	90	0	2	4	300	0	140	1	0	0	0	0	3	0	0	0	0	200	140	No	0	One-way stop
563845	Co Rd D33/250TH ST	MINING BLVD & HIGHWAY ST	5	< 1.5 mi	0	90	0	0	0	995	2	140	1	3	2	0	0	3	0	1	0	1	880	140	No	0	One-way stop
563849	Co Rd D33/255TH ST	Co Rd P59/NELSON AVE & HIGHWAY ST	5	< 1.5 mi	0	90	0	0	0	1,045	2	570	2	1	1	0	0	3	0	3	0	2	960	570	Yes	0	One-way stop
563903	Co Rd D20/OLD HWY 20	220TH ST	5	< 1.5 mi	0	90	0	0	0	3,310	3	260	2	0	0	0	0	3	0	3	0	1	4,550	260	No	0	One-way stop
564004	Co Rd P33/FAIRBANKS AVE	260TH ST	5	< 1.5 mi	0	90	0	0	0	958	2	40	1	1	1	0	0	4	1	0	0	0	950	40	No	0	Two-way stop
564064	Co Rd D20/XAVIER AVE	210TH ST	5	< 1.5 mi	0	90	0	0	0	1,938	3	45	1	0	0	0	0	4	1	1	0	0	2,140	45	No	0	Two-way stop
564080	Co Rd D20/200TH ST	TAYLOR AVE	5	< 1.5 mi	0	90	0	0	0	2,283	3	25	0	2	1	0	0	4	1	3	0	0	2,620	25	No	0	Two-way stop
564144	Co Rd D20/200TH ST	RACINE AVE	5	< 1.5 mi	0	90	0	0	0	3,100	3	80	1	2	1	0	0	3	0	1	0	1	3,650	80	No	0	One-way stop
564183	PARAGON AVE	210TH ST	5	< 1.5 mi	0	90	0	0	0	2,670	3	1,830	2	0	0	0	0	3	0	3	0	0	2,180	1,830	Yes	0	Two-way stop
564232	Co Rd P41/JOHNSON AVE	175TH ST	5	< 1.5 mi	0	90	0	0	0	590	1	60	1	0	0	1	2	4	1	2	1	2	510	60	No	0	Two-way stop
564241	Co Rd D14/170TH ST	ORCHARD RD	5	< 1.5 mi	0	90	0	0	0	2,825	3	480	2	0	0	0	0	3	0	3	0	2	3,200	480	Yes	0	One-way stop
564244	MADISON AVE	180TH ST	5	< 1.5 mi	0	90	0	0	0	930	2	390	2	1	1	0	0	3	0	0	0	0	790	390	No	0	One-way stop
564275	Co Rd D22/JOHNSON AVE/PARKER DR		0	5	< 1.5 mi	0	35	4	0	160	0	10	0	1	1	0	0	3	0	0	0	0	120	10	No	0	One-way stop
564290	Co Rd P33/210TH ST/HAYES AVE		0	5	< 1.5 mi	0	90	0	1	145	0	70	1	0	0	0	0	3	0	0	0	0	120	70	No	0	One-way stop
564378	Co Rd C56/120TH ST	Co Rd P63/SAMSON AVE	5	< 1.5 mi	0	90	0	0	0	980	2	50	1	1	1	0	0	4	1	0	0	0	820	50	No	0	Two-way stop
564388	Co Rd C56/VINCENT AVE	1ST ST & WADSON ST	5	< 1.5 mi	0	90	0	0	0	866	2	486	2	2	2	1	0	3	0	0	0	0	1,180	486	No	0	Uncontrolled
564438	Co Rd C56/120TH ST	NATIONAL AVE	5	< 1.5 mi	0	90	0	0	0	1,910	3	170	1	1	1	0	0	3	0	0	0	0	1,810	170	No	0	One-way stop
564450	Co Rd P56/NELSON AVE	130TH ST	5	< 1.5 mi	0	90	0	0	0	2,353	3	45	1	0	0	0	0	4	1	0	0	0	2,160	45	No	0	Two-way stop
564468	Co Rd P59/PARAGON AVE	150TH ST	5	< 1.5 mi	0	90	0	0	0	2,150	3	70	0	0	0	0	0	4	1	1	0	1	2,160	70	No	0	Two-way stop
565097	WALNUT ST	BOISE ST	5	< 1.5 mi	0	90	0	0	0	655	1	289	2	3	2	0	0	3	0	0	0	0	850	289	Yes	0	All-way stop
568638	Co Rd P73/COUNTY RD/310TH ST		0	5	< 1.5 mi	0	90	0	2	670	1	20	0	0	0	0	0	3	0	0	0	0	630	20	No	0	One-way stop
569782	S 14TH ST	22ND AVE S	5	< 1.5 mi	0	90	0	0	0	395	0	310	2	8	2	0	0	4	1	0	0	0	500	310	No	0	Uncontrolled
569794	S 15TH ST	22ND AVE S	5	< 1.5 mi	0	90	0	0	0	705	1	400	2	4	2	0	0	3	0	2	0	1	810	400	No	0	Uncontrolled
704669	US 20	2ND ST	5	< 1.5 mi	0	90	0	0	0	4,170	3	160	1	2	1	0	0	3	0	5	0	1	3,030	160	Yes	0	One-way stop
704743	DOLLIVER PARK AVE	DOLLIVER MEMORIAL	5	< 1.5 mi	0	90	0	1	4	240	0	0	0	1	1	0	0	3	0	0	0	0	280	0	No	0	Uncontrolled
704746	DOLLIVER PARK AVE	DOLLIVER MEMORIAL	5	< 1.5 mi	0	42	4	0	0	240	0	0	0	2	1	0	0	3	0	0	0	0	280	0	No	0	Uncontrolled
704795	MORTIMER ST	MARTIN ST	5	< 1.5 mi	0	90	0	0	0	1,065	2	289	2	1	1	0	0	3	0	1	0	0	950	289	Yes	0	One-way stop
704807	FRONT ST	CHURCH ST	5	< 1.5 mi	0	90	0	0	0	855	2	70	1	4	2	0	0	3	0	1	0	0	750	70	Yes	0	One-way stop
704812	HOOD ST	2ND ST	5	< 1.5 mi	0	90	0	0	0	705	1	289	2	5	2	0	0	3	0	0	0	0	390	289	Yes	0	One-way stop
704864	WALNUT ST	SUNSET DR	5	< 1.5 mi	0	90	0	0	0	645	1	289	2	5	2	0	0	3	0	1	0	0	850	289	Yes	0	Uncontrolled
704865	WALNUT ST	LUNDY ST	5	< 1.5 mi	0	90	0	0	0	645	1	289	2	5	2	0	0	3	0	1	0	0	850	289	Yes	0	One-way stop
704866	WALNUT ST	FOLGER ST	5	< 1.5 mi	0	90	0	0	0	645	1	289	2	4	2	0	0	3	0	0	0	0	850	289	Yes	0	One-way stop
705652	Co Rd P59/QUAIL AVE	MIDWAY BLVD & OLD US 20	5	< 1.5 mi	0	90	0	0	0	5,635	3	1,370	2	0	0	0	0	3	0	1	0	0	6,300	1,370	Yes	0	One-way stop
7000933	JA 7/190TH ST	HARVEST AVE	5	< 1.5 mi	0	90	0	0	0	3,743	3	1,250	2	0	0	0	0	3	0	1	0	0	3,910	1,250	No	0	One-way stop
221976	Co Rd D20/200TH ST	ABBOTT AVE	4	< 1.5 mi	0	90	0	0	0	2,058	3	15	0	1	1	0	0	3	0	0	0	0	2,160	15	No	0	One-way stop
248918	Co Rd P66/UTAH AVE/UNION AVE	100TH ST	4	< 1.5 mi	0	90	0	0	0	973	2	50	1	0	0	0	0	4	1	0	0	0	870	50	No	0	Two-way stop
562899	JA 7/190TH ST	KELLY AVE	4	< 1.5 mi	0	90	0	0	0	4,095	3	10	0	1	1	0	0	3	0	4	0	1	5,300	10	No	0	One-way stop
562981	JA 175/360TH ST	WALNUT ST	4	< 1.5 mi	0	90	0	0	0	1,810	3	60	1	0	0	0	0	3	0	0	0	0	1,640	60	No	0	One-way stop
563221	270TH ST	BRUSHY CREEK ST REC AREA	4	< 1.5 mi	0	90	0	1	4	130	0	0	0	0	0	0	0	3	0	0	0	0	330	0	No	0	One-way stop
563236	270TH ST	BRUSHY CREEK ST REC AREA	4	< 1.5 mi	0	90	0	1	4	130	0	0	0	0	0	0	0	3	0	0	0	0	330	0	No	0	One-way stop
563352	Co Rd P61/PARAGON AVE	350TH ST	4	< 1.5 mi	0	90	0	0	0	900	2	60	1	0	0	0	0	4	1	0	0	0	780	60	No	0	Two-way stop
563390	Co Rd P46/LAINSON AVE	4TH ST	4	< 1.5 mi	0	90	0	0	0	755																	



GPS ID	Paved Road	Intersecting Road	Risk Factor Points	Distance from Previous STOP (Value)	Distance from Previous STOP (Points)	Approach Angle (Value)	Approach Angle (Points)	Intersection within Curve (Value)	Intersection within Curve (Points)	Daily Entering Vehicles (Value)	Daily Entering Vehicles (Points)	Minor Street Volume (Value)	Minor Street Volume (Points)	Distance from Driveway or Intersection (Value)	Distance from Driveway or Intersection (Points)	K or A Crash (Value)	K or A Crash (Points)	Number of Approaches (Value)	Number of Approaches (Points)	Total Crashes	K and A	Right angle, rear-end, or turning crashes	Major ADT	Minor ADT	Destination Lighting	Transverse Rumble Strips (Number of Approaches)	Control Type
563350	Co Rd P73/RACINE AVE	350TH ST	3	< 1.5 mi	0	90	0	0	0	645	1	80	1	0	0	0	0	4	1	0	0	0	650	80	No	0	Two-way stop
563394	Co Rd P46/LAINSON AVE	380TH ST	3	< 1.5 mi	0	90	0	0	0	670	1	50	1	0	0	0	0	4	1	0	0	0	620	50	No	0	Two-way stop
563407	Co Rd D68/390TH ST	204TH AVE	3	< 1.5 mi	0	90	0	0	0	170	0	45	1	3	2	0	0	3	0	0	0	0	160	45	No	0	One-way stop
563456	Co Rd D68/390TH ST	Co Rd P29/BAXTER AVE	3	< 1.5 mi	0	90	0	0	0	698	1	45	1	0	0	0	0	4	1	2	0	0	960	45	No	0	Two-way stop
563475	Co Rd P73/UNION AVE	280TH ST	3	< 1.5 mi	0	90	0	0	0	520	1	50	1	0	0	0	0	4	1	0	0	0	510	50	No	0	Two-way stop
563485	Co Rd D46/290TH ST	TAYLOR AVE	3	< 1.5 mi	0	90	0	0	0	585	1	90	1	1	1	0	0	3	0	0	0	0	530	90	No	0	One-way stop
563554	Co Rd P61/PARAGON AVE	304TH ST	3	< 1.5 mi	0	90	0	0	0	850	2	20	0	2	1	0	0	3	0	0	0	0	780	20	No	0	One-way stop
563593	Co Rd D43/290TH ST	HAWKEYE AVE	3	< 1.5 mi	0	90	0	0	0	660	1	70	1	0	0	0	0	4	1	0	0	0	660	70	No	0	Two-way stop
563636	Co Rd D43/290TH ST	Co Rd P29/BAXTER AVE	3	< 1.5 mi	0	90	0	0	0	1,018	2	35	0	0	0	0	0	4	1	1	0	0	1,110	35	No	0	Two-way stop
563663	Co Rd D46/310TH ST	EASTER AVE	3	< 1.5 mi	0	90	0	0	0	360	0	50	1	1	1	0	0	4	1	0	0	0	250	50	No	0	Two-way stop
563674	Co Rd P29/BAXTER AVE	330TH ST	3	< 1.5 mi	0	90	0	0	0	1,015	2	15	0	0	0	0	0	4	1	0	0	0	1,080	15	No	0	Two-way stop
563713	Co Rd P6D/250TH ST/SAMSON AVE		0	3	< 1.5 mi	0	75	2	0	400	0	60	1	0	0	0	0	3	0	1	0	0	370	60	No	1	One-way stop
563805	Co Rd P6D/235TH ST	POPLAR AVE	3	< 1.5 mi	0	90	0	0	0	485	1	110	1	0	0	0	0	4	1	2	0	1	560	110	No	0	Two-way stop
563918	Co Rd P51/JOHNSON AVE	240TH ST	3	< 1.5 mi	0	90	0	0	0	410	1	40	1	0	0	0	0	4	1	0	0	0	300	40	No	0	Two-way stop
563926	Co Rd D33/250TH ST	Co Rd P51/JOHNSON AVE	3	< 1.5 mi	0	90	0	0	0	423	1	70	1	0	0	0	0	4	1	0	0	0	300	70	No	0	Two-way stop
564012	Co Rd P29/BAXTER AVE	270TH ST	3	< 1.5 mi	0	90	0	0	0	995	2	10	0	1	1	0	0	3	0	2	0	0	1,110	10	No	0	Two-way stop
564018	Co Rd P33/FAIRBANKS AVE	270TH ST	3	< 1.5 mi	0	90	0	0	0	935	2	15	0	1	1	0	0	3	0	0	0	0	950	15	No	0	One-way stop
564023	Co Rd P71/VINCENT AVE	160TH ST	3	< 1.5 mi	0	90	0	0	0	1,133	2	25	0	0	0	0	0	4	1	0	0	0	1,310	25	No	0	Two-way stop
564038	Co Rd P71/VINCENT AVE	180TH ST	3	< 1.5 mi	0	90	0	0	0	968	2	30	0	0	0	0	0	4	1	1	0	1	1,120	30	No	0	Two-way stop
564043	Co Rd D18/190TH ST	TAYLOR AVE	3	< 1.5 mi	0	90	0	0	0	1,035	2	25	0	0	0	0	0	4	1	0	0	0	1,040	25	No	0	Two-way stop
564049	Co Rd D18/190TH ST	UNION AVE	3	< 1.5 mi	0	90	0	0	0	1,015	2	10	0	1	1	0	0	3	0	2	0	0	1,040	10	No	0	One-way stop
564099	ORCHARD RD	160TH ST	3	< 1.5 mi	0	90	0	0	0	510	1	190	2	0	0	0	0	3	0	0	0	0	520	190	No	0	Two-way stop
564103	Co Rd P53/NATIONAL AVE/160TH ST		0	3	< 1.5 mi	0	90	0	0	680	1	450	2	0	0	0	0	3	0	1	0	0	730	450	No	0	One-way stop
564356	Co Rd P66/UNION AVE	110TH ST	3	< 1.5 mi	0	90	0	0	0	963	2	30	0	0	0	0	0	4	1	0	0	0	870	30	Yes	0	Two-way stop
564362	Co Rd C56/120TH ST/VINCENT AVE	Co Rd C58	3	< 1.5 mi	0	90	0	0	0	493	1	60	1	0	0	0	0	4	1	2	0	0	520	60	No	0	Two-way stop
564372	Co Rd C56/VINCENT AVE	130TH ST	3	< 1.5 mi	0	90	0	0	0	503	1	60	1	0	0	0	0	4	1	1	0	0	520	60	No	0	Two-way stop
564395	Co Rd C56/140TH ST	XAVIER AVE	3	< 1.5 mi	0	90	0	0	0	910	2	20	0	0	0	0	0	4	1	0	0	0	970	20	No	0	Two-way stop
564428	Co Rd C56/120TH ST	RACINE AVE	3	< 1.5 mi	0	90	0	0	0	985	2	25	0	0	0	0	0	4	1	0	0	0	820	25	No	0	Two-way stop
564436	Co Rd C56/120TH ST	OATES AVE	3	< 1.5 mi	0	90	0	0	0	1,398	3	35	0	0	0	0	0	3	0	0	0	0	1,610	35	No	0	One-way stop
564460	Co Rd P53/NATIONAL AVE	130TH ST	3	< 1.5 mi	0	90	0	0	0	455	1	40	1	0	0	0	0	4	1	0	0	0	170	40	No	0	Two-way stop
564462	Co Rd P53/NATIONAL AVE	140TH ST	3	< 1.5 mi	0	90	0	0	0	475	1	90	1	1	1	0	0	3	0	1	0	0	450	90	No	0	One-way stop
564526	Co Rd P41/JOHNSON AVE	150TH ST	3	< 1.5 mi	0	90	0	0	0	340	0	70	1	1	1	0	0	4	1	0	0	0	210	70	No	0	Two-way stop
564528	Co Rd C66/140TH ST	INDIANA AVE	3	< 1.5 mi	0	90	0	0	0	823	2	25	0	0	0	0	0	4	1	0	0	0	750	25	No	0	Two-way stop
564564	Co Rd P29/FAIRBANKS AVE	130TH ST	3	< 1.5 mi	0	90	0	0	0	608	1	50	1	0	0	0	0	4	1	0	0	0	390	50	No	0	Two-way stop
564584	Co Rd C66/140TH ST	BAXTER AVE	3	< 1.5 mi	0	90	0	0	0	615	1	15	0	0	0	0	0	4	1	0	0	0	470	50	No	0	Two-way stop
568466	204TH AVE	393RD ST	3	< 1.5 mi	0	90	0	0	0	68	0	15	0	6	2	0	0	4	1	0	0	0	40	15	No	0	Uncontrolled
568470	204TH AVE	394TH ST	3	< 1.5 mi	0	90	0	0	0	78	0	5	0	7	2	0	0	4	1	0	0	0	30	20	No	0	Uncontrolled
568767	21ST AVE S	S 15TH ST	3	< 1.5 mi	0	90	0	0	0	395	0	90	1	5	2	0	0	3	1	2	0	2	470	90	No	0	Uncontrolled
568774	S 13TH ST	22ND AVE S	3	< 1.5 mi	0	90	0	0	0	380	0	160	1	4	2	0	0	3	0	1	0	0	310	160	No	0	One-way stop
569958	Co Rd P29/DAKOTA AVE	200TH ST	3	< 1.5 mi	0	90	0	0	0	365	0	30	0	0	0	1	2	4	1	1	1	1	650	30	No	0	Two-way stop
704814	HOOD ST	CYCLONE ST	3	< 1.5 mi	0	90	0	0	0	575	1	30	0	3	2	0	0	3	0	0	0	0	390	30	Yes	0	One-way stop
705797	360TH ST	1ST ST NW	3	< 1.5 mi	0	90	0	0	0	385	0	289	2	1	1	0	0	3	0	0	0	0	580	289	Yes	0	Yield sign
3000434	THEATER RD	LIBERTY LN	3	< 1.5 mi	0	90	0	0	0	165	0	50	1	5	2	0	0	3	0	0	0	0	140	50	No	0	One-way stop
44413	Co Rd R21/NATURE RD/CHASE AVE	100TH ST	2	< 1.5 mi	0	90	0	0	0	463	1	25	0	1	1	0	0	3	0	0	0	0	390	25	No	0	One-way stop
69553	US 20/270TH ST	ADAMS AVE	2	< 1.5 mi	0	90	0	0	0	1,128	2	10	0	0	0	0	0	3	0	1	0	0	930	10	No	0	One-way stop
204941	Co Rd P46/X AVE/LAINSON AVE	100TH	2	< 1.5 mi	0	90	0	0	0	475	1	30	0	0	0	0	0	4	1	0	0	0	550	30	No	0	Two-way stop
204977	Co Rd P29/N AVE/BAXTER AVE	100TH	2	< 1.5 mi	0	90	0	0	0	703	1	20	0	0	0	0	0	4	1	0	0	0	960	20	No	0	Two-way stop
248974	Co Rd P59/PENN AVE/PARAGON AVE	100TH ST	2	< 1.5 mi	0	90	0	0	0	1,098	2	15	0	0	0	0	0	3	0	0	0	0	840	15	No	0	One-way stop
563349	Co Rd P73/RACINE AVE	340TH ST	2	< 1.5 mi	0	90	0	0	0	595	1	25	0	0	0	0	0	4	1	0	0	0	650	25	No	0	Two-way stop
563362	Co Rd D68/390TH ST	RACINE AVE	2	< 1.5 mi	0	90	0	0	0	180	0	70	1	0	0	0	0	4	1	0	0	0	180	70	No	0	Two-way stop
563409	Co Rd D68/390TH ST	LANYON ST	2	< 1.5 mi	0	90	0	0	0	145	0	25	0	3	2	0	0	3	0	0	0	0	160	25	No	0	One-way stop
563435	Co Rd D60/350TH ST	EASTERN AVE	2	< 1.5 mi	0	90	0	0	0	735	1	50	1	0	0	0	0	3	0	0	0	0	570	50	No	0	One-way stop
563441	Co Rd P33/FAIRBANKS AVE	355TH ST & CO RD P33	2	< 1.5 mi	0	90	0	0	0	970	2	15	0	0	0	0	0	3	0	0	0	0	1,160	15	No	0	One-way stop
563448	Co Rd P29/BAXTER AVE	370TH ST	2	< 1.5 mi	0	90	0	0	0	675	1	15	0	0	0	0	0	4	1	1	0	0	960	15	No	0	Two-way stop
563450	Co Rd P29/BAXTER AVE	380TH ST	2	< 1.5 mi	0	90	0	0	0	680	1	10	0	0	0	0	0	4	1	2	0	0	960	10	No	0	Two-way stop
563452	Co Rd P33/FAIRBANKS AVE	380TH ST	2	< 1.5 mi	0	90	0	0	0	303	0	40	1	0	0	0	0	4	1	0	0	0	290	40	No	0	Two-way stop
563454	Co Rd D68/390TH ST	Co Rd P33/FAIRBANKS AVE	2	< 1.5 mi	0	90	0	0	0	320	0	60	1	0	0	0	0	4	1	0	0	0	290	60	No	0	Two-way stop
563479	Co Rd D46/290TH ST	SARA AVE	2	< 1.5 mi	0	90	0	0	0	570	1	60	1	0	0	0	0	3	0	0	0	0	530	60	No	0	One-way stop
563521	Co Rd D54/330TH ST	VASSE AVE	2	< 1.5 mi	0	90	0	0	0																		



GPS ID	Paved Road	Intersecting Road	Risk Factor Points	Distance from Previous STOP (Value)	Distance from Previous STOP (Points)	Approach Angle (Value)	Approach Angle (Points)	Intersection within Curve (Value)	Intersection within Curve (Points)	Daily Entering Vehicles (Value)	Daily Entering Vehicles (Points)	Minor Street Volume (Value)	Minor Street Volume (Points)	Distance from Driveway or Intersection (Value)	Distance from Driveway or Intersection (Points)	K or A Crash (Value)	K or A Crash (Points)	Number of Approaches (Value)	Number of Approaches (Points)	Total Crashes	K and A	Right angle, rear-end, or turning crashes	Major ADT	Minor ADT	Destination Lighting	Transverse Rumble Strips (Number of Approaches)	Control Type
564030	Co Rd P63/SAMSON AVE	180TH ST	1	< 1.5 mi	0	90	0	0	0	280	0	80	1	0	0	0	0	3	0	2	0	1	260	80	No	0	One-way stop
564289	Co Rd D22/210TH ST	Co Rd P33/HAYES AVE	1	< 1.5 mi	0	90	0	0	0	173	0	45	1	0	0	0	0	3	0	0	0	0	120	45	No	0	One-way stop
564319	Co Rd P29/FAIRBANKS AVE	160TH ST	1	< 1.5 mi	0	90	0	0	0	620	1	20	0	0	0	0	0	3	0	0	0	0	560	20	No	0	One-way stop
564348	CARTER AVE	210TH ST	1	< 1.5 mi	0	90	0	0	0	205	0	50	1	0	0	0	0	3	0	1	0	0	180	50	No	0	One-way stop
564370	Co Rd C56/120TH ST	VASSE AVE	1	< 1.5 mi	0	90	0	0	0	463	1	25	0	0	0	0	0	3	0	0	0	0	520	25	No	0	One-way stop
564493	Co Rd C56/115TH ST	ITASKA AVE	1	< 1.5 mi	0	90	0	0	0	170	0	35	0	0	0	0	0	4	1	0	0	0	140	35	No	0	Two-way stop
564503	Co Rd C56/115TH ST	KELLY AVE	1	< 1.5 mi	0	90	0	0	0	145	0	10	0	1	1	0	0	3	0	0	0	0	140	10	No	0	One-way stop
564589	Co Rd C66/140TH ST	ADARE AVE	1	< 1.5 mi	0	90	0	0	0	565	1	10	0	0	0	0	0	3	0	1	0	0	470	10	No	0	One-way stop
568474	204TH AVE	NO NAME	1	< 1.5 mi	0	90	0	0	0	63	0	10	0	2	1	0	0	3	0	0	0	0	30	10	No	0	Not Reported
569710	GANZ RD	180TH ST	1	< 1.5 mi	0	90	0	0	0	325	0	60	1	0	0	0	0	3	0	0	0	0	420	60	No	0	One-way stop
569932	Co Rd P29/FAIRBANKS AVE	185TH ST	1	< 1.5 mi	0	90	0	0	0	620	1	20	0	0	0	0	0	3	0	0	0	0	560	20	No	0	One-way stop
570346	100TH ST	EASTER AVE	1	< 1.5 mi	0	90	0	0	0	73	0	40	1	0	0	0	0	3	0	0	0	0	50	40	No	0	One-way stop
704711	BRUSHY CREEK ST REC AREA	BRUSHY CREEK ST REC AREA	0	1	< 1.5 mi	0	90	0	0	110	0	0	0	2	1	0	0	3	0	0	0	0	180	0	No	0	One-way stop
704735	Co Rd P73/UNION AVE		1	< 1.5 mi	0	90	0	0	0	610	1	0	0	0	0	0	0	3	0	1	0	0	820	0	No	0	Uncontrolled
218340	Co Rd D46/290TH ST	Co Rd R19/CHASE AVE	0	< 1.5 mi	0	90	0	0	0	323	0	25	0	0	0	0	0	3	0	0	0	0	350	25	No	0	One-way stop
563324	Co Rd D64/WASHINGTON AVE	375TH ST	0	< 1.5 mi	0	90	0	0	0	165	0	10	0	0	0	0	0	3	0	0	0	0	150	10	No	0	One-way stop
563405	Co Rd D68/390TH ST	NO NAME	0	< 1.5 mi	0	90	0	0	0	155	0	30	0	0	0	0	0	3	0	0	0	0	160	30	No	0	One-way stop
563517	Co Rd D54/330TH ST	UNION AVE	0	< 1.5 mi	0	90	0	0	0	220	0	20	0	0	0	0	0	3	0	0	0	0	200	20	No	0	One-way stop
563519	Co Rd D54/330TH ST	UNION AVE	0	< 1.5 mi	0	90	0	0	0	213	0	5	0	0	0	0	0	3	0	0	0	0	200	5	No	0	One-way stop
563523	Co Rd D54/330TH ST	WASHINGTON AVE	0	< 1.5 mi	0	90	0	0	0	220	0	20	0	0	0	0	0	3	0	0	0	0	200	20	No	0	One-way stop
563963	Co Rd D26/230TH ST	EASTER AVE	0	< 1.5 mi	0	90	0	0	0	285	0	10	0	0	0	0	0	3	0	1	0	0	290	10	No	0	One-way stop
564101	160TH ST	NATIONAL AVE	0	< 1.5 mi	0	90	0	0	0	285	0	30	0	0	0	0	0	3	0	0	0	0	520	30	No	0	One-way stop
564211	Co Rd P41/JOHNSON AVE	160TH ST	0	< 1.5 mi	0	90	0	0	0	315	0	30	0	0	0	0	0	3	0	0	0	0	210	30	No	0	One-way stop
564273	Co Rd D22/PARKER DR	JOHNSON AVE	0	< 1.5 mi	0	90	0	0	0	255	0	10	0	0	0	0	0	3	0	0	0	0	200	10	No	0	One-way stop
564345	CARTER AVE	200TH ST & CO RD	0	< 1.5 mi	0	90	0	0	0	225	0	30	0	0	0	0	0	3	0	0	0	0	210	30	No	0	One-way stop
704733	Co Rd D46/290TH ST	BRUSHY CREEK ST REC AREA	0	< 1.5 mi	0	90	0	0	0	400	0	0	0	0	0	0	0	3	0	1	0	0	410	0	No	0	One-way stop

APPENDIX D1

CURVE SAFETY COUNTERMEASURES

This appendix summarizes the **curve** safety countermeasures for consideration and provides detailed descriptions for each countermeasure from both the project selection decision tree as well as the additional potential improvements listed on the back side of the project sheets.

CURVE COUNTERMEASURES FROM PROJECT SELECTION DECISION TREE

The countermeasures in this section were included in the project selection decision tree and recommended on the curve project sheets based on the criteria described in **Section 6.4.1**.

New Pavement Markings

This safety countermeasure includes new centerline and edgeline pavement markings along the curve. The updated markings can clarify and further delineate the curve, reducing the risk of a run-off-the-road crash. If the lanes were 12 feet or wider, new edgeline pavement markings of six inches were recommended; otherwise, new four-inch pavement markings were recommended. Research suggests that widening pavement markings from four to six inches in rural areas results in a CMF of 0.64 to 0.83.

Pave Shoulder with Safety Edge

Constructing or increasing the width of an existing paved shoulder can reduce the potential for a severe crash as the result of a lane departure. CMFs associated with paving the shoulder in rural areas range from 0.82 to 0.9. At locations where paved shoulders are recommended, it is suggested that the County Engineer consider a minimum of a two-foot shoulder; however, based on right-of-way and roadway characteristics, the County Engineer may choose to install a wider shoulder.

According to the FHWA, a Safety Edge is “a simple but effective solution that can help save lives by allowing drivers who drift off [roadways] to return to the road safely. Instead of a vertical drop-off, the Safety Edge shapes the edge of pavement to 30 degrees.” The installation of a Safety Edge has CMFs ranging from 0.85 to 0.92. According to the FHWA, from a maintenance standpoint, “because the Safety Edge provides an additional level of consolidation on the edge, edge raveling is decreased. This contributes to longer pavement life.”

Edgeline Rumble Strips

Edgeline rumble strips provide tactile and audible warning to a driver if they are beginning to depart the lane. This safety improvement has recorded CMFs in the range of 0.61 to 0.67 for rural run-off-the-road injury crashes. Depending on the conditions of the roadway, the County Engineer may choose to install rumble strips placed in the shoulder offset from the edgeline, or they may place the rumble strips on the edgeline and provide pavement markings over them, resulting in edgeline rumble strips. For purposes of this document, both will be called rumble strips.

Centerline Rumble Strips

CMFs of 0.55 to 0.91 represent the safety benefit from the installation of centerline rumble strips. In Iowa, rumble strips placed in the centerline of the roadway generally have pavement markings over them. To be consistent with the Iowa DOT Design Manual 3C-5, centerline rumble strips will be referred to as rumble strips even though in circumstances they may technically be “rumble stripes”. This safety improvement provides an audible and tactile warning to drivers when crossing the centerline and can aid in the avoidance of some high severity lane departure crashes on curves.



Review Curves and Install Chevron Signs and Curve Warning Signs

This safety countermeasure includes the review of the curve and the installation of curve chevron signs placed along the outer radius of the curve and advanced curve warning signs with advisory speed plaques. Installing curve chevron signs where advanced warning signs are currently in place has CMFs ranging from 0.75 to 0.96, and when installed together with new advance warning signage, has CMFs ranging from 0.59 to 0.61. The signs should meet current MUTCD and Iowa DOT standards.

Review Curves and Upgrade Chevron Signs and Curve Warning Signs

Where curve chevron signs, advance curve warning signs, and speed advisory plaques are already installed, this countermeasure includes reviewing the curve and upgrading the signage to meet current MUTCD and Iowa DOT standards, if needed.

Clear and Grub

Clearing and grubbing the areas within the clear zone of the roadway increases the sight distance for vehicles prior to entering, during, and after exiting a curve. This safety countermeasure also reduces the hazard of a run-off-the-road crash by reducing the number of obstructions a vehicle could impact after a lane departure. A 0.78 CMF has been documented as distance from roadside features was increased.

OTHER CURVE COUNTERMEASURES

There are a variety of other safety improvements that could be considered that were not included in the project decision tree due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed at curves throughout the county. The following sections describe several other curve safety improvements that could be considered appropriate by the county and that were included on the back side of the project sheets.

Additional Curve Signage

Curve signage in addition to the signage included in the project sheets could be considered, including the one direction large arrow sign (W1-6 48"x24") and the combination horizontal alignment/advisory speed sign (W1-1a 36"x36"). This additional curve signage could be appropriate in some situations to provide further emphasis to the change in horizontal alignment of the roadway.

Retroreflective Strips on Chevron Sign Posts

The installation of retroreflective strips on sign posts is currently under study by Iowa State University (InTrans) and the preliminary results are positive. This countermeasure includes the installation of retroreflective strips on the posts of curve chevron signs. The strips can increase the visibility of curve chevron signs and increase driver awareness of changes in horizontal alignment. Public response to this countermeasure has been very positive.

Transverse Rumble Strips Prior to Curve

This treatment can provide additional tactile and audible warning to the driver of an upcoming curve. It is recommended that this treatment be used with caution as the driver may misinterpret the warning since transverse rumble strips in Iowa are typically installed prior to stop-controlled intersections. Transverse rumble strips installed as a traffic calming device have seen CMFs of 0.66.

Superelevation Correction

The use of superelevation, where none exists, or the correction of existing superelevation, can provide a safety benefit, helping to keep vehicles within the travel lanes while negotiating a curve. This recommendation is site-specific and would need additional attention by the County Engineer in order to be implemented at a specific location.

High Friction Surface Treatment (HFST)

Increasing the pavement friction on curves by installation of HFST has CMFs ranging from 0.48 to 0.76. According to the FHWA,

“HFSTs use aggregates that are both polish- and wear-resistant and develop channels to prevent water buildup on wet surfaces. The bonding materials such as epoxy and other available blends are designed to set quickly. HFST can be applied by machine at a similar speed to other paving surface treatments, or applied with hand tools, but the road surface must be durable with few to no cracks and crumbling.”

This treatment can be particularly beneficial on high-speed curves and curves with small radii to decrease the risk of skidding-related crashes.

Speed Activated Flashers on Chevron Signs

This improvement can provide additional warning to drivers exceeding the suggested speed limit through a curved section of roadway. When the speed limit is exceeded, flashers are activated to advise drivers to slow down prior to the change in horizontal alignment. Where speed activated flashers have been installed in combination with curve chevrons and curve warning signage, CMFs of 0.59 to 0.61 have been recorded.

Guardrail

Installing guardrail can help redirect vehicles after a lane departure to remain on the roadway and avoid roadside hazards. CMFs in the range of 0.53 have been recorded for installing new guardrail along an embankment.

On-pavement Markings for Speed Control

This improvement includes painting the speed limit on the pavement to reinforce the posted speed limit. On-pavement markings can serve as additional information and reminders to drivers of the posted speed limit and the importance of observing their speed.

Post-Mounted Delineators

As stated in the MUTCD, “delineators are particularly beneficial at locations where the [roadway] alignment might be confusing or unexpected, such as at lane-reduction transitions and curves. Delineators are effective guidance devices at night and during adverse weather. An important advantage of delineators in certain locations is that they remain visible when the roadway is wet or snow covered.” Providing post-mounted retroreflective delineators along the roadway can give additional information to drivers as to the location of the roadside edge and alignment. The CMF for installing post-mounted delineators in combination with edgelines and centerlines has been recorded at 0.55.



APPENDIX D2
CURVE PROJECT SHEETS

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 18



Project Name: Curve 115802 on THEATER RD
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 10/2/17

Prepared By: DJG/DVM
Checked By: MMO

CURVE

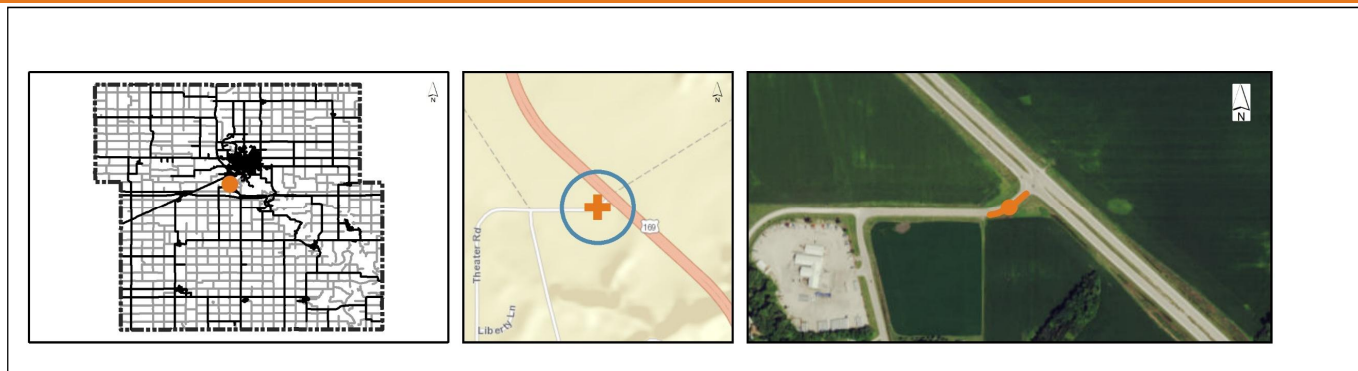
Location Description

Road: THEATER RD
Length (feet): 241 **Length (Miles):** 0.05

Closest City: FORT DODGE

GPS ID: 115802

Project Location Maps



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	2,240	6
Curve Radius (ft)	320	4
Shoulder Width (ft)	5	2
Avg. Pavement Condition (IRI)	168	1
Intersections Driveways	1 0	3
K or A Crash	1	2
Total Risk Factor Points (21 max)		18

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	5
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Existing Curve Chevrons	No

Crash Data, 2007-2016	
Total Crashes	5
K and A Crashes	1
Lane Departure Crashes	0
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	1,341.6
K and A Crash Rate (per HMVMT)	268.3

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,200	\$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.05	MILE	\$ 1,800	\$ 82
Install 4" Retroreflective Centerline	0.05	MILE	\$ 800	\$ 36
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.05	MILE	\$ 65,000	\$ 2,963
Install Edgeline Rumble Strips (Both Sides of Road)	0.05	MILE	\$ 2,500	\$ 114
Install Centerline Rumble Strips	0.05	MILE	\$ 1,000	\$ 46
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	1	CURVE	\$ 5,000	\$ 5,000
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 2,500	\$ -
Clear and Grub (15 ft Both Sides of Road)	0.05	MILE	\$ 10,000	\$ 456
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 8,697

Continued on back of this page.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 18



CURVE

Project Name: Curve 115802 on THEATER RD
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 10/2/17

Prepared By: DJG/DVM
Checked By: MMO

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 115802

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	\$ 1,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		CURVE	\$ 2,000	\$ -
Superelevation Correction		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Guardrail		MILE	\$ 50,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Post-Mounted Delineators		MILE	\$ 1,000	\$ -
Provide a Southbound Right-Turn Lane at Intersection	1	EA	\$ 75,000	\$ 75,000
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ 75,000
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 8,697
Subtotal:				\$ 83,697
Mobilization: (% +/-)*				10% \$ 8,370
Traffic Control: (% +/-)				5% \$ 4,187
Contingency: (% +/-)				20% \$ 16,746
Estimated Project Cost				\$ 113,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only Kimley-Horn's judgment as a design professional familiar with the construction industry. Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:

The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. No formal assessment was made for the improvement recommendations contained on this page, if in question, it is recommended that a study/analysis of this location be made to warrant the above indicated improvements. This project description form is based on our knowledge as of October 2016.

End of Project Description

[Back Page](#)

Local Road Safety Plan

Project Description for Curve Improvements

Risk Factor Points: 16



Project Name: Curve 95978/95979 on NELSON AVE
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountyia.org

Date: 10/2/17

Prepared By: DJG/DVM
 Checked By: MMO

CURVE

Location Description

Road: **NELSON AVE**
 Length (feet): **456** Length (Miles): **0.09**

Closest City: **OTHO**

GPS ID: **95978**
/95979

Project Location Maps



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1,180	5
Curve Radius (ft)	909	3
Shoulder Width (ft)	1	4
Avg. Pavement Condition (IRI)	111	1
Intersections Driveways	1 4	3
K or A Crash	0	0
Total Risk Factor Points (21 max)		16

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	1
Speed Limit (mph)	55
Lane Width (ft)	11
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Existing Curve Chevrons	No

Crash Data, 2007-2016	
Total Crashes	0
K and A Crashes	0
Lane Departure Crashes	0
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	0.0
K and A Crash Rate (per HMVMT)	0.0

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.09	MILE	\$ 1,200	\$ 104
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,800	\$ -
Install 4" Retroreflective Centerline	0.09	MILE	\$ 800	\$ 69
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.00	MILE	\$ 65,000	\$ -
Install Edgeline Rumble Strips (Both Sides of Road)	0.09	MILE	\$ 2,500	\$ 216
Install Centerline Rumble Strips	0.09	MILE	\$ 1,000	\$ 86
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	1	CURVE	\$ 5,000	\$ 5,000
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 2,500	\$ -
Clear and Grub (15 ft Both Sides of Road)	0.09	MILE	\$ 10,000	\$ 864
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 6,339

Continued on back of this page.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 16



CURVE

Project Name: Curve 95978/95979 on NELSON AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 10/2/17

Prepared By: DJG/DVM
Checked By: MMO

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 95978/95979

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	\$ 1,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		CURVE	\$ 2,000	\$ -
Superelevation Correction		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Guardrail		MILE	\$ 50,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Post-Mounted Delineators		MILE	\$ 1,000	\$ -
Other:				
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 6,339
Subtotal:				\$ 6,339
Mobilization: (% +/-)*				10% \$ 2,500
Traffic Control: (% +/-)				5% \$ 432
Contingency: (% +/-)				20% \$ 1,729
Estimated Project Cost				\$ 11,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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Project Description Form Disclaimer:

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End of Project Description

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Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 16



CURVE

Project Name: Curve 102721 on PARAGON AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 10/2/17

Prepared By: DJG/DVM
Checked By: MMO

Location Description

Road: PARAGON AVE
Length (feet): 164
Length (Miles): 0.03

Closest City: FORT DODGE

GPS ID: 102721

Project Location Maps



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1,730	6
Curve Radius (ft)	145	4
Shoulder Width (ft)	3	2
Avg. Pavement Condition (IRI)	414	2
Intersections Driveways	0 0	0
K or A Crash	3	2
Total Risk Factor Points (21 max)		16

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	3
Speed Limit (mph)	55
Lane Width (ft)	11
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Existing Curve Chevrons	Yes

Crash Data, 2007-2016	
Total Crashes	13
K and A Crashes	3
Lane Departure Crashes	2
Lane Departure K and A Crashes	1
Total Crash Rate (per HMVMT)	6,622.6
K and A Crash Rate (per HMVMT)	1,528.3

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.03	MILE	\$ 1,200	\$ 37
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,800	\$ -
Install 4" Retroreflective Centerline	0.03	MILE	\$ 800	\$ 25
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.03	MILE	\$ 65,000	\$ 2,021
Install Edgeline Rumble Strips (Both Sides of Road)	0.03	MILE	\$ 2,500	\$ 78
Install Centerline Rumble Strips	0.03	MILE	\$ 1,000	\$ 31
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	1	CURVE	\$ 2,500	\$ 2,500
Clear and Grub (15 ft Both Sides of Road)	0.03	MILE	\$ 10,000	\$ 311
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 5,003

Continued on back of this page.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 16



CURVE

Project Name: Curve 102721 on PARAGON AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 10/2/17

Prepared By: DJG/DVM
Checked By: MMO

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 102721

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	\$ 1,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		CURVE	\$ 2,000	\$ -
Superelevation Correction		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Guardrail		MILE	\$ 50,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Post-Mounted Delineators		MILE	\$ 1,000	\$ -
Other:				
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 5,003
Subtotal:				\$ 5,003
Mobilization: (% +/-)*				10% \$ 2,500
Traffic Control: (% +/-)				5% \$ 299
Contingency: (% +/-)				20% \$ 1,198
Estimated Project Cost				\$ 9,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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End of Project Description

[Back Page](#)

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 15



Project Name: Curve 18506 on 200TH ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 10/2/17

Prepared By: DJG/DVM
Checked By: MMO

CURVE

Location Description

Road: 200TH ST
Length (feet): 1,243

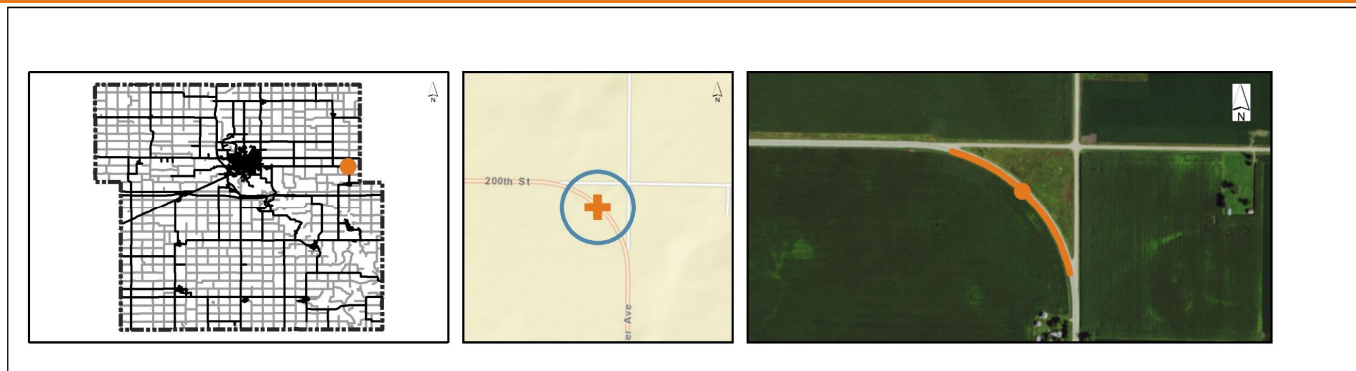
Length (Miles): 0.24

Closest City: DUNCOMBE

GPS ID: 18506

This curve is located within the following high scoring segment: GPS ID 2802

Project Location Maps



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	2,140	6
Curve Radius (ft)	1,083	1
Shoulder Width (ft)	5	2
Avg. Pavement Condition (IRI)	107	1
Intersections Driveways	2 0	3
K or A Crash	1	2
Total Risk Factor Points (21 max)		15

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	5
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Existing Curve Chevrons	Yes

Crash Data, 2007-2016	
Total Crashes	10
K and A Crashes	1
Lane Departure Crashes	2
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	543.9
K and A Crash Rate (per HMVMT)	54.4

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,200	\$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.24	MILE	\$ 1,800	\$ 424
Install 4" Retroreflective Centerline	0.24	MILE	\$ 800	\$ 188
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.24	MILE	\$ 65,000	\$ 15,301
Install Edgeline Rumble Strips (Both Sides of Road)	0.24	MILE	\$ 2,500	\$ 589
Install Centerline Rumble Strips	0.24	MILE	\$ 1,000	\$ 235
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	1	CURVE	\$ 2,500	\$ 2,500
Clear and Grub (15 ft Both Sides of Road)	0.24	MILE	\$ 10,000	\$ 2,354
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 21,591

Continued on back of this page.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 15



CURVE

Project Name: Curve 18506 on 200TH ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 10/2/17

Prepared By: DJG/DVM
Checked By: MMO

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 18506

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	\$ 1,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		CURVE	\$ 2,000	\$ -
Superelevation Correction		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves	0.24	MILE	\$ 150,000	\$ 35,310
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Guardrail		MILE	\$ 50,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Post-Mounted Delineators		MILE	\$ 1,000	\$ -
Other:				
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ 35,310
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 21,591
Subtotal:				\$ 56,901
Mobilization: (% +/-)*				10% \$ 5,700
Traffic Control: (% +/-)				5% \$ 2,880
Contingency: (% +/-)				20% \$ 11,519
Estimated Project Cost				\$ 77,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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End of Project Description

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Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 15



CURVE

Project Name: Curve 75149 on PATTERSON FIELD RD
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 10/2/17

Prepared By: DJG/DVM
Checked By: MMO

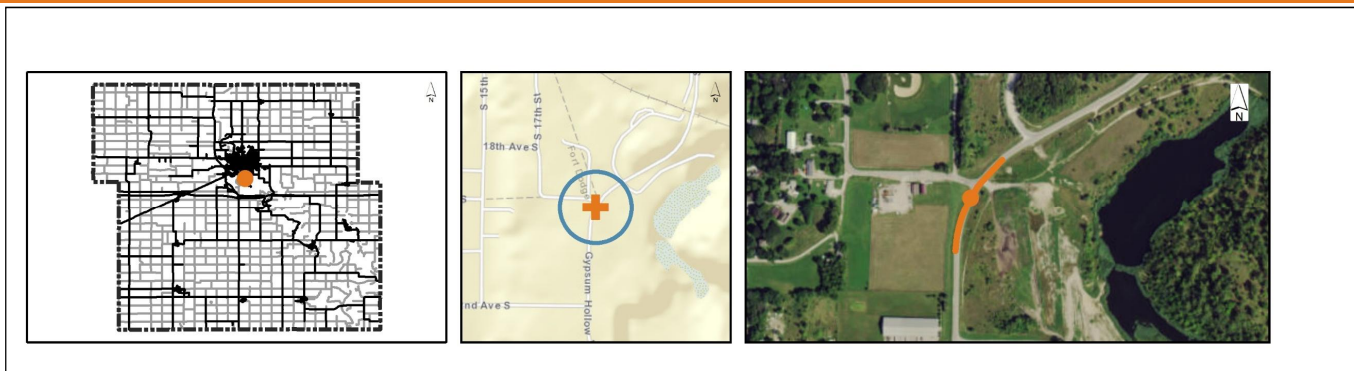
Location Description

Road: PATTERSON FIELD RD
Length (feet): 588 **Length (Miles):** 0.11

Closest City: FORT DODGE

GPS ID: 75149

Project Location Maps



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	500	4
Curve Radius (ft)	615	3
Shoulder Width (ft)	2	2
Avg. Pavement Condition (IRI)	136	1
Intersections Driveways	1 0	3
K or A Crash	1	2
Total Risk Factor Points (21 max)		15

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	2
Speed Limit (mph)	25
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Existing Curve Chevrons	Yes

Crash Data, 2007-2016	
Total Crashes	2
K and A Crashes	1
Lane Departure Crashes	0
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	983.7
K and A Crash Rate (per HMVMT)	491.8

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,200	\$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.11	MILE	\$ 1,800	\$ 201
Install 4" Retroreflective Centerline	0.11	MILE	\$ 800	\$ 89
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.11	MILE	\$ 65,000	\$ 7,242
Install Edgeline Rumble Strips (Both Sides of Road)	0.11	MILE	\$ 2,500	\$ 279
Install Centerline Rumble Strips	0.00	MILE	\$ 1,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	1	CURVE	\$ 2,500	\$ 2,500
Clear and Grub (15 ft Both Sides of Road)	0.11	MILE	\$ 10,000	\$ 1,114
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 11,425

Continued on back of this page.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 15



CURVE

Project Name: Curve 75149 on PATTERSON FIELD RD
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 10/2/17

Prepared By: DJG/DVM
Checked By: MMO

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 75149

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	\$ 1,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		CURVE	\$ 2,000	\$ -
Superelevation Correction		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Guardrail		MILE	\$ 50,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Post-Mounted Delineators		MILE	\$ 1,000	\$ -
Other:				
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 11,425
Subtotal:				\$ 11,425
Mobilization: (% +/-)*				10% \$ 2,500
Traffic Control: (% +/-)				5% \$ 615
Contingency: (% +/-)				20% \$ 2,460
Estimated Project Cost				\$ 17,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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End of Project Description

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Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 15



CURVE

Project Name: Curve 95780 on NATIONAL AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 10/2/17

Prepared By: DJG/DVM
Checked By: MMO

Location Description

Road: NATIONAL AVE
Length (feet): 156
Length (Miles): 0.03

Closest City: FORT DODGE

GPS ID: 95780

Project Location Maps



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	500	4
Curve Radius (ft)	192	4
Shoulder Width (ft)	6	0
Avg. Pavement Condition (IRI)	174	2
Intersections Driveways	1 0	3
K or A Crash	1	2
Total Risk Factor Points (21 max)		15

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	6
Speed Limit (mph)	35
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Existing Curve Chevrons	Yes

Crash Data, 2007-2016	
Total Crashes	3
K and A Crashes	1
Lane Departure Crashes	1
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	5,579.2
K and A Crash Rate (per HMVMT)	1,859.7

Key Emphasis Areas
Local Roads
Lane Departures
Roadside Collisions

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,200	\$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.03	MILE	\$ 1,800	\$ 53
Install 4" Retroreflective Centerline	0.03	MILE	\$ 800	\$ 24
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.03	MILE	\$ 65,000	\$ 1,915
Install Edgeline Rumble Strips (Both Sides of Road)	0.03	MILE	\$ 2,500	\$ 74
Install Centerline Rumble Strips	0.00	MILE	\$ 1,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	1	CURVE	\$ 2,500	\$ 2,500
Clear and Grub (15 ft Both Sides of Road)	0.03	MILE	\$ 10,000	\$ 295
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 4,861

Continued on back of this page.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 15



CURVE

Project Name: Curve 95780 on NATIONAL AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 10/2/17

Prepared By: DJG/DVM
Checked By: MMO

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 95780

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Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	\$ 1,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		CURVE	\$ 2,000	\$ -
Superelevation Correction		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Guardrail		MILE	\$ 50,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Post-Mounted Delineators		MILE	\$ 1,000	\$ -
Other:				
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 4,861
Subtotal:				\$ 4,861
Mobilization: (% +/-)*				10% \$ 2,500
Traffic Control: (% +/-)				5% \$ 328
Contingency: (% +/-)				20% \$ 1,311
Estimated Project Cost				\$ 9,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

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End of Project Description

[Back Page](#)

Local Road Safety Plan

Project Description for Curve Improvements

Risk Factor Points: **15**



CURVE

Project Name: Curve 95980 on RIVERSIDE TRL
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 10/2/17

Prepared By: DJG/DVM
Checked By: MMO

Location Description

Road: **RIVERSIDE TRL**
 Length (feet): **285** Length (Miles): **0.05**

Closest City: **OTHO**

GPS ID: **95980**

Project Location Maps



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	650	5
Curve Radius (ft)	812	3
Shoulder Width (ft)	5	2
Avg. Pavement Condition (IRI)	417	2
Intersections Driveways	2 9	3
K or A Crash	0	0
Total Risk Factor Points (21 max)		15

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	5
Speed Limit (mph)	55
Lane Width (ft)	12
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Existing Curve Chevrons	No

Crash Data, 2007-2016	
Total Crashes	0
K and A Crashes	0
Lane Departure Crashes	0
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	0.0
K and A Crash Rate (per HMVMT)	0.0

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,200	\$ -
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.05	MILE	\$ 1,800	\$ 97
Install 4" Retroreflective Centerline	0.05	MILE	\$ 800	\$ 43
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.05	MILE	\$ 65,000	\$ 3,503
Install Edgeline Rumble Strips (Both Sides of Road)	0.05	MILE	\$ 2,500	\$ 135
Install Centerline Rumble Strips	0.00	MILE	\$ 1,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	1	CURVE	\$ 5,000	\$ 5,000
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 2,500	\$ -
Clear and Grub (15 ft Both Sides of Road)	0.05	MILE	\$ 10,000	\$ 539
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 9,317

Continued on back of this page.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 15



CURVE

Project Name: Curve 95980 on RIVERSIDE TRL
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 10/2/17

Prepared By: DJG/DVM
Checked By: MMO

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 95980

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	\$ 1,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		CURVE	\$ 2,000	\$ -
Superelevation Correction		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Guardrail		MILE	\$ 50,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Post-Mounted Delineators		MILE	\$ 1,000	\$ -
Other:				
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 9,317
Subtotal:				\$ 9,317
Mobilization: (% +/-)*				10% \$ 2,500
Traffic Control: (% +/-)				5% \$ 637
Contingency: (% +/-)				20% \$ 2,546
Estimated Project Cost				\$ 15,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

Opinion of Probable Construction Cost Disclaimer:

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End of Project Description

[Back Page](#)

Local Road Safety Plan

Project Description for Curve Improvements

Risk Factor Points: 14



CURVE

Project Name: Curve 94303 on MILL RD
 Agency Name: Webster County
 Contact Name: Will, Randy
 E-mail: engineer@webstercountyia.org

Date: 1/15/18

Prepared By: DJG/DVM
 Checked By: MMO

Location Description

Road: **MILL RD**
 Length (feet): **209**

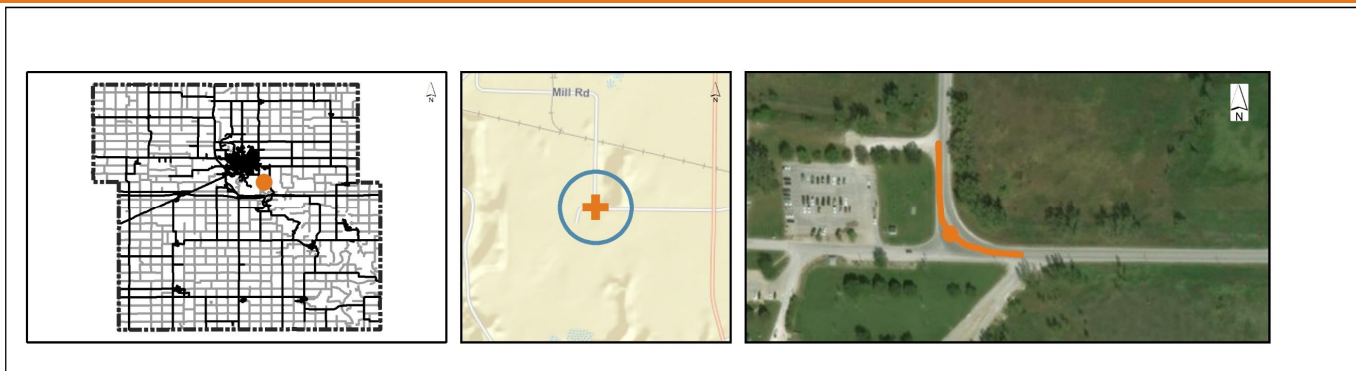
Length (Miles): **0.04**

Closest City: **FORT DODGE**

GPS ID: **94303**

This curve is located within the following high scoring segment: GPS ID 2866

Project Location Maps



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	1,730	6
Curve Radius (ft)	262	4
Shoulder Width (ft)	3	2
Avg. Pavement Condition (IRI)	109	1
Intersections Driveways	0 1	1
K or A Crash	0	0
Total Risk Factor Points (21 max)		14

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	3
Speed Limit (mph)	55
Lane Width (ft)	11
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Existing Curve Chevrons	Yes

Crash Data, 2007-2016	
Total Crashes	2
K and A Crashes	0
Lane Departure Crashes	1
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	799.2
K and A Crash Rate (per HMVMT)	0.0

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.04	MILE	\$ 1,200	\$ 48
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,800	\$ -
Install 4" Retroreflective Centerline	0.04	MILE	\$ 800	\$ 32
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.04	MILE	\$ 65,000	\$ 2,576
Install Edgeline Rumble Strips (Both Sides of Road)	0.04	MILE	\$ 2,500	\$ 99
Install Centerline Rumble Strips	0.04	MILE	\$ 1,000	\$ 40
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	1	CURVE	\$ 2,500	\$ 2,500
Clear and Grub (15 ft Both Sides of Road)	0.04	MILE	\$ 10,000	\$ 396
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 5,691

Continued on back of this page.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 14



CURVE

Project Name: Curve 94303 on MILL RD
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 1/15/18

Prepared By: DJG/DVM
Checked By: MMO

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 94303

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	\$ 1,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		CURVE	\$ 2,000	\$ -
Superelevation Correction		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Guardrail		MILE	\$ 50,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Post-Mounted Delineators		MILE	\$ 1,000	\$ -
Other:				
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 5,691
Subtotal:				\$ 5,691
Mobilization: (% +/-)*				10% \$ 2,500
Traffic Control: (% +/-)				5% \$ 362
Contingency: (% +/-)				20% \$ 1,447
Estimated Project Cost				\$ 10,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

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End of Project Description

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Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 14



CURVE

Project Name: Curve 41297/106818 on RACINE AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 1/15/18

Prepared By: DJG/DVM
Checked By: MMO

Location Description

Road: RACINE AVE
Length (feet): 729
Length (Miles): 0.14

Closest City: LEHIGH

GPS ID: 41297/106818

Project Location Maps



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	650	5
Curve Radius (ft)	947	3
Shoulder Width (ft)	6	0
Avg. Pavement Condition (IRI)	109	1
Intersections Driveways	1 0	3
K or A Crash	1	2
Total Risk Factor Points (21 max)		14

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	6
Speed Limit (mph)	55
Lane Width (ft)	11
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Existing Curve Chevrons	Yes

Crash Data, 2007-2016	
Total Crashes	2
K and A Crashes	1
Lane Departure Crashes	0
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	610.7
K and A Crash Rate (per HMVMT)	305.3

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.14	MILE	\$ 1,200	\$ 166
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,800	\$ -
Install 4" Retroreflective Centerline	0.14	MILE	\$ 800	\$ 110
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.14	MILE	\$ 65,000	\$ 8,973
Install Edgeline Rumble Strips (Both Sides of Road)	0.14	MILE	\$ 2,500	\$ 345
Install Centerline Rumble Strips	0.00	MILE	\$ 1,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	1	CURVE	\$ 2,500	\$ 2,500
Clear and Grub (15 ft Both Sides of Road)	0.14	MILE	\$ 10,000	\$ 1,380
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 13,474

Continued on back of this page.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 14



CURVE

Project Name: Curve 41297/106818 on RACINE AVE
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 1/15/18

Prepared By: DJG/DVM
Checked By: MMO

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 41297/106818

There are a variety of other safety improvements that could be considered that were not included on the front page of the project sheet due to availability of data, the need for site-specific information, and/or the appetite for the countermeasure to be deployed throughout the county. The following countermeasures could be considered appropriate by the county and included below as additional potential improvements.

Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	\$ 1,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		CURVE	\$ 2,000	\$ -
Superelevation Correction		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Guardrail		MILE	\$ 50,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Post-Mounted Delineators		MILE	\$ 1,000	\$ -
Other:				
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 13,474
Subtotal:				\$ 13,474
Mobilization: (% +/-)* 10%				\$ 2,500
Traffic Control: (% +/-) 5%				\$ 805
Contingency: (% +/-) 20%				\$ 3,221
Estimated Project Cost				\$ 20,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

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End of Project Description

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Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 14



CURVE

Project Name: Curve 124722 on SIMPSON ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 1/15/18

Prepared By: DJG/DVM
Checked By: MMO

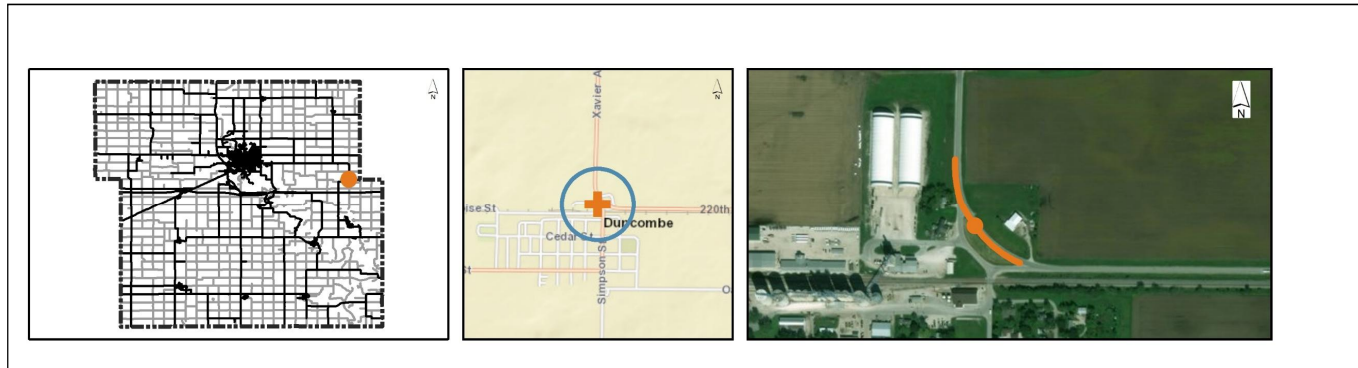
Location Description

Road: SIMPSON ST
Length (feet): 726
Length (Miles): 0.14

Closest City: DUNCOMBE

GPS ID: 124722

Project Location Maps



Curve Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points
Average Daily Traffic (ADT)	900	5
Curve Radius (ft)	609	3
Shoulder Width (ft)	2	2
Avg. Pavement Condition (IRI)	96	1
Intersections Driveways	3 4	3
K or A Crash	0	0
Total Risk Factor Points (21 max)		14

Other Information	
Paved Shoulder	No
Shoulder Width (ft)	2
Speed Limit (mph)	55
Lane Width (ft)	11
Number of Lanes	2
Edgeline Rumble Strips	No
Centerline Rumble Strips	No
Existing Curve Chevrons	Yes

Crash Data, 2007-2016	
Total Crashes	5
K and A Crashes	0
Lane Departure Crashes	0
Lane Departure K and A Crashes	0
Total Crash Rate (per HMVMT)	1,106.4
K and A Crash Rate (per HMVMT)	0.0

Key Emphasis Areas	
Local Roads	
Lane Departures	
Roadside Collisions	

Opinion of Probable Cost (Project Selection Decision Tree Results)

Item Description	Quantity	Unit	Unit Price	Item Cost
Install 4" Retroreflective Edgeline (Both Sides of Road)	0.14	MILE	\$ 1,200	\$ 165
Install 6" Retroreflective Edgeline (Both Sides of Road)	0.00	MILE	\$ 1,800	\$ -
Install 4" Retroreflective Centerline	0.14	MILE	\$ 800	\$ 110
Pave 2' Shoulder with Safety Edge (Both Sides of Road)	0.14	MILE	\$ 65,000	\$ 8,942
Install Edgeline Rumble Strips (Both Sides of Road)	0.14	MILE	\$ 2,500	\$ 344
Install Centerline Rumble Strips	0.00	MILE	\$ 1,000	\$ -
Review Curve and Provide Signage to Meet MUTCD and Iowa DOT Standards, if Needed	0	CURVE	\$ 5,000	\$ -
Review and Upgrade Curve Signage to Meet MUTCD and Iowa DOT Standards, if Needed	1	CURVE	\$ 2,500	\$ 2,500
Clear and Grub (15 ft Both Sides of Road)	0.14	MILE	\$ 10,000	\$ 1,376
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 13,437

Continued on back of this page.

Project Location Map Sources:

Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

Front Page

Local Road Safety Plan
Project Description for Curve Improvements

Risk Factor Points: 14



Project Name: Curve 124722 on SIMPSON ST
Agency Name: Webster County
Contact Name: Will, Randy
E-mail: engineer@webstercountyia.org

Date: 1/15/18

Prepared By: DJG/DVM
Checked By: MMO

CURVE

Opinion of Probable Cost (Additional Potential Improvements)

GPS ID: 124722

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Item Description	Quantity	Unit	Unit Price	Item Cost
Additional Curve Signage		CURVE	\$ 1,000	\$ -
Retroreflective Strips on Chevron Sign Posts		CURVE	\$ 100	\$ -
Transverse Rumble Strips Prior to Curve		CURVE	\$ 2,000	\$ -
Superelevation Correction		EA	\$ 100,000	\$ -
Install High Friction Surface Treatment (HFST) on Curves		MILE	\$ 150,000	\$ -
Speed Activated Flashers on Chevron Signs		EA	\$ 2,000	\$ -
Guardrail		MILE	\$ 50,000	\$ -
On-Pavement Markings for Speed Control		EA	\$ 500	\$ -
Post-Mounted Delineators		MILE	\$ 1,000	\$ -
Other:				
Other:				
Other:				
Other:				
Additional Potential Improvements Subtotal:				\$ -
Project Selection Decision Tree Systemic Improvements Subtotal:				\$ 13,437
Subtotal:				\$ 13,437
Mobilization: (% +/-)*				10% \$ 2,500
Traffic Control: (% +/-)				5% \$ 813
Contingency: (% +/-)				20% \$ 3,250
Estimated Project Cost				\$ 20,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

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End of Project Description

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APPENDIX D3

CURVE RISK FACTOR RANKING RESULTS



GPS ID	Paved Road	Length (ft)	Risk Factor Points	Average Daily Traffic (Value)	Average Daily Traffic (Points)	Curve Radius (ft) (Value)	Curve Radius (Points)	Shoulder Width (Value)	Shoulder Width (Points)	Pavement Condition (Value)	Pavement Condition (Points)	Intersections Driveways (Value)	Intersections Driveways (Points)	K or A Crash (Value)	K or A Crash (Points)	Total Crashes	K and A	Paved Shoulder	Speed Limit	Rumble Strips	Existing Curve Chevrons	Lane Width (ft)
115802	THEATER RD	241	18	2,240	6	320	4	5	2	168	1	1 0	3	1	2	5	1	No	55	No	No	12
95978	NELSON AVE	233	16	1,180	5	909	3	1	4	111	1	1 4	3	0	0	0	0	No	55	No	No	11
102721	PARAGON AVE	164	16	1,730	6	145	4	3	2	414	2	0 0	0	3	2	13	3	No	55	No	Yes	11
18506	200TH ST	1,243	15	2,140	6	1,083	1	5	2	107	1	2 0	3	1	2	10	1	No	55	No	Yes	12
75149	PATTERSON FIELD RD	588	15	500	4	615	3	2	2	136	1	1 0	3	1	2	2	1	No	25	No	Yes	12
95780	NATIONAL AVE	156	15	500	4	192	4	6	0	174	2	1 0	3	1	2	3	1	No	35	No	Yes	12
95980	RIVERSIDE TRL	285	15	650	5	812	3	5	2	417	2	2 9	3	0	0	0	0	No	55	No	No	12
101930	OTHO DR	259	15	770	5	305	4	1	4	213	2	0 0	0	0	0	2	0	No	25	No	No	10
10792	160TH ST	107	14	190	1	132	4	1	4	197	2	0 6	1	1	2	3	1	No	25	No	No	11
41303	330TH ST	154	14	200	2	439	4	4	2	156	1	1 0	3	2	2	2	2	No	55	No	Yes	11
65391	DOLLIVER PARK AVE	301	14	280	3	293	4	1	4	178	2	0 1	1	0	0	1	0	No	55	No	No	10
65394	DOLLIVER PARK AVE	582	14	280	3	376	4	1	4	164	1	0 0	0	1	2	2	1	No	55	No	No	10
65397	DOLLIVER PARK AVE	301	14	280	3	287	4	1	4	133	1	0 0	0	1	2	1	1	No	20	No	No	10
65400	DOLLIVER PARK AVE	514	14	280	3	595	3	1	4	122	1	1 0	3	0	0	0	0	No	20	No	No	10
65403	DOLLIVER PARK AVE	293	14	280	3	794	3	1	4	167	1	1 1	3	0	0	0	0	No	20	No	No	10
69191	ELM DR	139	14	340	3	432	4	0	4	565	2	0 12	1	0	0	0	0	No	25	No	No	15.5
94303	MILL RD	209	14	1,730	6	262	4	3	2	109	1	0 1	1	0	0	2	0	No	55	No	Yes	11
106818	RACINE AVE	729	14	650	5	947	3	6	0	109	1	1 0	3	1	2	2	1	No	55	No	Yes	11
124699	XAVIER AVE	984	14	200	2	945	3	4	2	191	2	1 0	3	2	2	4	2	No	55	No	Yes	11
124722	SIMPSON ST	726	14	900	5	609	3	2	2	96	1	3 4	3	0	0	5	0	No	55	No	Yes	11
25334	NELSON AVE	160	13	2,190	6	319	4	10	0	84	0	7 3	3	0	0	2	0	No	55	No	No	11
42330	340TH ST	359	13	200	2	435	4	4	2	207	2	2 0	3	0	0	0	0	No	55	No	Yes	11
63772	OLD HWY 20	109	13	4,550	6	65	4	10	0	0	0	1 2	3	0	0	4	0	No	45	No	No	12
65405	DOLLIVER PARK AVE	993	13	280	3	411	4	1	4	171	2	0 0	0	0	0	0	0	No	20	No	No	10
65407	DOLLIVER PARK AVE	294	13	280	3	1,407	1	1	4	414	2	1 0	3	0	0	1	0	No	55	No	No	12
69271	ELM ST	156	13	50	0	317	4	0	4	328	2	1 8	3	0	0	0	0	No	25	No	No	15
73181	290TH ST	839	13	660	5	758	3	6	0	267	2	2 0	3	0	0	3	0	No	40	No	Yes	11.5
75150	GYPSUM HOLLOW RD	682	13	2,330	6	827	3	6	0	377	2	0 0	0	1	2	5	1	No	55	No	Yes	12
91980	MADISON AVE	530	13	630	4	567	3	3	2	110	1	3 0	3	0	0	3	0	No	45	No	Yes	11
95981	ELM ST	2,051	13	1,610	5	1,317	1	0	4	82	0	1 23	3	0	0	2	0	No	25	No	No	15
95983	NELSON AVE	335	13	2,560	6	948	3	10	0	154	1	7 8	3	0	0	4	0	No	55	No	No	11
99584	260TH ST	102	13	360	3	206	4	3	2	166	1	1 0	3	0	0	0	0	No	55	No	Yes	12
100358	OLD HWY 20	109	13	4,550	6	65	4	10	0	0	0	1 2	3	0	0	4	0	No	45	No	No	12
101931	OTHO DR	192	13	770	5	347	4	3	2	306	2	0 0	0	0	0	1	0	No	25	No	No	11
101934	OTHO DR	210	13	770	5	1,074	1	3	2	536	2	1 2	3	0	0	0	0	No	25	No	No	11
105567	QUAIL AVE	614	13	5,200	6	780	3	10	0	168	1	1 0	3	0	0	13	0	No	55	No	No	20
105568	QUAIL AVE	1,054	13	5,200	6	803	3	10	0	142	1	1 4	3	0	0	7	0	No	55	No	No	20
124696	340TH ST	439	13	200	2	457	4	4	2	216	2	2 0	3	0	0	1	0	No	55	No	Yes	11
124697	XAVIER AVE	108	13	200	2	299	4	4	2	207	2	1 1	3	0	0	0	0	No	55	No	Yes	11
8350	170TH ST	897	12	2,700	6	1,241	1	6	0	81	0	1 0	3	1	2	5	1	Yes	55	No	Yes	12
28702	255TH ST	686	12	360	3	562	3	2	2	100	1	1 2	3	0	0	0	0	No	55	No	Yes	12
29774	260TH ST	871	12	360	3	658	3	3	2	106	1	1 0	3	0	0	1	0	No	55	No	Yes	12
29778	260TH ST	912	12	280	3	647	3	2	2	109	1	0 2	1	1	2	1	1	No	55	No	Yes	12
29779	260TH ST	515	12	280	3	617	3	2	2	118	1	1 2	3	0	0	0	0	No	55	No	Yes	12
31633	270TH ST	421	12	330	3	1,472	1	1	4	100	1	1 0	3	0	0	0	0	No	55	No	No	11
31640	270TH ST	641	12	180	1	461	4	1	4	73	0	1 0	3	0	0	0	0	No	55	No	No	11
34984	CO RTE D43	684	12	640	5	370	4	10	0	67	0	1 2	3	0	0	3	0	No	55	No	Yes	11
34985	CO RTE D43	174	12	640	5	105	4	10	0	0	0	1 0	3	0	0	1	0	No	55	No	No	11
41297	330TH ST	649	12	650	5	830	3	6	0	112	1	1 0	3	0	0	1	0	No	55	No	Yes	11
58285	BRUSHY CREEK ST REC AREA	173	12	180	1	335	4	1	4	97	1	0 0	0	1	2	1	1	No	55	No	No	11
58286	BRUSHY CREEK ST REC AREA	1,194	12	180	1	367	4	1	4	65	0	0 1	1	1	2	3	1	No	55	No	No	11
58287	BRUSHY CREEK ST REC AREA	194	12	180	1	991	3	1	4	110	1	1 0	3	0	0	0	0	No	55	No	No	11
65392	DOLLIVER PARK AVE	439	12	280	3	307	4	1	4	120	1	0 0	0	0	0	2	0	No	55	No	No	10
65393	DOLLIVER PARK AVE	152	12	280	3	877	3	1	4	211	2	0 0	0	0	0	1	0	No	55	No	No	10
65399	DOLLIVER PARK AVE	134	12	280	3	539	3	1	4	280	2	0 0	0	0	0	0	0	No	20	No	No	10
65411	DOLLIVER PARK AVE	270	12	280	3	357	4	1	4	112	1	0 0	0	0	0	1	0	No	55	No	Yes	12
75147	GYPSUM HOLLOW RD	654	12	430	4	638	3	6	0	195	2	1 2	3	0	0	0	0	No	55	No	Yes	12
86934	KANSAS AVE	523	12	270	2	2,084	1	1	4	178	2	2 3	3	0	0	0	0	No	35	No	No	12
94304	MILL RD	145	12	1,730	6	93	4	3	2	87	0	0 0	0	0	0	4	0	No	55	No	Yes	11
95781	NATIONAL AVE	336	12	240	2	802	3	3	2	185	2	1 0	3	0	0	1	0	No	35	No	No	11
95984	NELSON AVE	652	12	2,560	6	1,370	1	10	0	335	2	2 21	3	0	0	1	0	No	55	No	No	11



GPS ID	Paved Road	Length (ft)	Risk Factor Points	Average Daily Traffic (Value)	Average Daily Traffic (Points)	Curve Radius (ft) (Value)	Curve Radius (Points)	Shoulder Width (Value)	Shoulder Width (Points)	Pavement Condition (Value)	Pavement Condition (Points)	Intersections Driveways (Value)	Intersections Driveways (Points)	K or A Crash (Value)	K or A Crash (Points)	Total Crashes	K and A	Paved Shoulder	Speed Limit	Rumble Strips	Existing Curve Chevrons	Lane Width (ft)
99585	OAK AVE	125	12	360	3	490	4	3	2	67	0	1 1	3	0	0	0	0	No	55	No	Yes	12
100351	OLD US 20	778	12	930	5	1,353	1	8	0	105	1	2 0	3	1	2	10	1	Yes	55	No	No	12
100420	KANSAS AVE	942	12	410	4	1,396	1	1	4	82	0	2 15	3	0	0	1	0	No	35	No	No	12
101933	OTHO DR	1,357	12	770	5	847	3	3	2	189	2	0 0	0	0	0	1	0	No	25	No	No	11
108896	RIVERSIDE TRL	645	12	200	2	872	3	5	2	209	2	1 2	3	0	0	0	0	No	55	No	Yes	12
110343	SAMSON AVE	441	12	370	3	731	3	6	0	138	1	1 0	3	1	2	2	1	No	55	No	No	11
120459	290TH ST	125	12	410	4	845	3	5	2	78	0	1 0	3	0	0	0	0	No	55	No	No	11
23016	225TH ST	722	11	5	0	476	4	4	2	404	2	2 0	3	0	0	1	0	No	55	No	No	11
25014	SWALLOW AVE	581	11	560	4	762	3	3	2	243	2	0 0	0	0	0	5	0	No	55	No	Yes	11
31644	270TH ST	1,450	11	330	3	1,103	1	1	4	94	0	2 0	3	0	0	1	0	No	35	No	No	11
34974	290TH ST	780	11	660	5	770	3	6	0	92	0	2 0	3	0	0	3	0	No	40	No	Yes	11.5
34980	290TH ST	282	11	350	3	893	3	5	2	210	2	0 1	1	0	0	1	0	No	55	No	No	11
35584	295TH ST	764	11	660	5	743	3	6	0	67	0	2 0	3	0	0	1	0	No	55	No	Yes	11.5
38612	SAMSON AVE	503	11	630	4	196	4	6	0	81	0	2 0	3	0	0	1	0	No	55	No	No	11
38613	SAMSON AVE	1,208	11	630	4	262	4	6	0	80	0	2 0	3	0	0	2	0	No	55	No	Yes	11
43228	PARAGON AVE	656	11	780	5	1,765	1	6	0	533	2	2 1	3	0	0	3	0	No	55	No	No	11
44262	390TH	450	11	150	1	434	4	3	2	153	1	3 0	3	0	0	1	0	No	55	No	Yes	11
55840	BAXTER AVE	835	11	570	4	978	3	6	0	154	1	2 0	3	0	0	0	0	No	55	No	Yes	11
63980	BAXTER AVE	286	11	570	4	237	4	6	0	0	0	1 0	3	0	0	1	0	No	55	No	Yes	11
63981	DAKOTA AVE	169	11	570	4	174	4	6	0	0	0	1 0	3	0	0	1	0	No	55	No	Yes	11
65398	DOLLIVER PARK AVE	288	11	280	3	550	3	1	4	130	1	0 0	0	0	0	0	0	No	20	No	No	10
73180	295TH ST	764	11	660	5	743	3	6	0	67	0	2 0	3	0	0	1	0	No	55	No	Yes	11.5
74461	GRANT AVE	192	11	2,830	6	1,123	1	10	0	99	1	1 0	3	0	0	1	0	No	55	No	No	16
95982	NELSON AVE	800	11	2,560	6	1,147	1	10	0	103	1	8 5	3	0	0	2	0	No	55	No	No	11
98573	OLD HWY 50	630	11	640	5	1,783	1	10	0	195	2	1 0	3	0	0	1	0	No	55	No	Yes	11
101579	ORCHARD RD	115	11	480	4	204	4	6	0	81	0	1 0	3	0	0	2	0	No	55	No	No	12
102857	PARKER DR	846	11	1,130	5	1,138	1	3	2	59	0	1 5	3	0	0	1	0	No	55	No	Yes	11
105570	QUAIL AVE	1,601	11	7,000	6	1,247	1	10	0	131	1	0 2	1	2	2	14	2	Yes	55	No	No	11
114763	SWALLOW AVE	438	11	560	4	537	3	3	2	216	2	0 0	0	0	0	1	0	No	55	No	Yes	11
118124	GRANT AVE	168	11	3,130	6	354	4	10	0	96	1	0 0	0	0	0	1	0	No	55	No	No	16
121968	WASHINGTON AVE	464	11	150	1	456	4	3	2	100	1	3 0	3	0	0	0	0	No	55	No	Yes	11
124672	390TH	450	11	150	1	434	4	3	2	153	1	3 0	3	0	0	1	0	No	55	No	Yes	11
8349	170TH ST	104	10	3,200	6	1,386	1	6	0	64	0	1 0	3	0	0	3	0	Yes	55	No	No	12
29775	260TH ST	552	10	280	3	586	3	2	2	104	1	0 2	1	0	0	0	0	No	55	No	Yes	12
34978	290TH ST	174	10	350	3	820	3	5	2	100	1	0 2	1	0	0	0	0	No	55	No	No	11
43547	370TH ST	131	10	90	0	334	4	4	2	107	1	1 0	3	0	0	0	0	No	55	No	No	11
44254	390TH	169	10	120	0	337	4	3	2	120	1	2 1	3	0	0	1	0	No	55	No	Yes	11
44255	390TH	228	10	120	0	408	4	3	2	138	1	3 1	3	0	0	1	0	No	55	No	Yes	11
44266	RIVER WAY	463	10	150	1	453	4	3	2	83	0	3 0	3	0	0	1	0	No	55	No	Yes	11
44271	WASHINGTON AVE	423	10	150	1	504	3	3	2	100	1	3 0	3	0	0	0	0	No	55	No	Yes	11
55841	BAXTER AVE	568	10	570	4	795	3	6	0	70	0	1 0	3	0	0	1	0	No	55	No	Yes	11
60604	390TH	228	10	120	0	408	4	3	2	138	1	3 1	3	0	0	1	0	No	55	No	Yes	11
60605	390TH	169	10	120	0	337	4	3	2	120	1	2 1	3	0	0	1	0	No	55	No	Yes	11
63428	SAMSON AVE	675	10	630	4	868	3	6	0	93	0	1 0	3	0	0	2	0	No	45	No	Yes	11
63429	SAMSON AVE	276	10	630	4	515	3	6	0	116	1	0 0	0	2	2	3	2	No	45	No	Yes	11
85938	PARKER DR	207	10	110	0	335	4	3	2	122	1	3 2	3	0	0	1	0	No	55	No	Yes	11
95764	NATIONAL AVE	743	10	450	4	1,687	1	4	2	65	0	1 2	3	0	0	2	0	No	55	No	No	12
95776	NATIONAL AVE	1,541	10	740	5	1,600	1	3	2	373	2	0 0	0	0	0	2	0	No	35	No	No	11
100355	OLD HWY 20	715	10	3,860	6	1,577	1	6	0	61	0	1 1	3	0	0	4	0	No	55	No	No	12
102731	PARAGON AVE	874	10	840	5	1,601	1	6	0	99	1	1 1	3	0	0	3	0	No	55	No	Yes	11
102852	PARKER DR	207	10	110	0	335	4	3	2	122	1	3 2	3	0	0	1	0	No	55	No	Yes	11
102856	PARKER DR	546	10	1,130	5	1,830	1	3	2	103	1	0 1	1	0	0	0	0	No	45	No	Yes	11
105571	QUAIL AVE	555	10	7,000	6	1,249	1	10	0	43	0	1 0	3	0	0	7	0	Yes	55	No	No	11
106815	RACINE AVE	702	10	110	0	661	3	2	2	395	2	1 1	3	0	0	0	0	No	55	No	No	11
108894	RIVERSIDE TRL	151	10	120	0	333	4	1	4	169	1	0 11	1	0	0	0	0	No	25	No	No	11
108895	RIVERSIDE TRL	2,168	10	200	2	1,416	1	5	2	282	2	1 1	3	0	0	0	0	No	55	No	Yes	12
124676	RIVER WAY	463	10	150	1	453	4	3	2	83	0	3 0	3	0	0	1	0	No	55	No	Yes	11
2212	110TH ST	781	9	140	1	717	3	6	0	185	2	2 0	3	0	0	0	0	No	55	No	Yes	11
2926	115TH ST	921	9	140	1	770	3	6	0	239	2	2 0	3	0	0	0	0	No	55	No	Yes	11
8351	NATIONAL AVE	588	9	240	2	1,034	1	3	2	156	1	1 1	3	0	0	5	0	No	35	No	Yes	11
27800	250TH ST	252	9	370	3	923	3	4	2	100	1	0 0	0	0	0	0	0	No	55	No	No	12



GPS ID	Paved Road	Length (ft)	Risk Factor Points	Average Daily Traffic (Value)	Average Daily Traffic (Points)	Curve Radius (ft) (Value)	Curve Radius (Points)	Shoulder Width (Value)	Shoulder Width (Points)	Pavement Condition (Value)	Pavement Condition (Points)	Intersections Driveways (Value)	Intersections Driveways (Points)	K or A Crash (Value)	K or A Crash (Points)	Total Crashes	K and A	Paved Shoulder	Speed Limit	Rumble Strips	Existing Curve Chevrons	Lane Width (ft)
31634	270TH ST	584	9	330	3	1,182	1	1	4	135	1	0 0	0	0	0	0	0	No	55	No	No	11
31636	270TH ST	637	9	180	1	1,275	1	1	4	53	0	1 0	3	0	0	0	0	No	55	No	No	11
34975	290TH ST	354	9	350	3	814	3	5	2	136	1	0 0	0	0	0	1	0	No	55	No	No	11
34979	290TH ST	915	9	350	3	1,586	1	5	2	73	0	1 2	3	0	0	2	0	No	55	No	No	11
34989	290TH ST	120	9	660	5	1,064	1	6	0	42	0	1 0	3	0	0	2	0	No	55	No	Yes	11.5
60603	390TH	180	9	120	0	535	3	3	2	168	1	1 0	3	0	0	1	0	No	55	No	No	11
83007	115TH ST	921	9	140	1	770	3	6	0	239	2	2 0	3	0	0	0	0	No	55	No	Yes	11
83009	INDIANA AVE	143	9	140	1	738	3	6	0	176	2	1 0	3	0	0	0	0	No	55	No	No	11
83011	110TH ST	781	9	140	1	717	3	6	0	185	2	2 0	3	0	0	0	0	No	55	No	Yes	11
85934	JOHNSON AVE	645	9	5	0	306	4	4	2	0	0	2 0	3	0	0	0	0	No	55	No	No	11
85935	JOHNSON AVE	158	9	5	0	101	4	4	2	0	0	1 0	3	0	0	0	0	No	55	No	No	11
90306	LIBERTY LN	219	9	50	0	145	4	3	2	286	2	0 10	1	0	0	0	0	No	55	No	No	15.5
95779	NATIONAL AVE	158	9	500	4	613	3	6	0	429	2	0 0	0	0	0	0	0	No	55	No	Yes	12
98572	OLD HWY 50	338	9	640	5	1,595	1	10	0	61	0	3 0	3	0	0	0	0	No	55	No	No	11
101580	ORCHARD RD	1,785	9	480	4	931	3	4	2	46	0	0 0	0	0	0	1	0	No	55	No	Yes	12
102715	PARAGON AVE	795	9	780	5	1,957	1	6	0	0	0	2 1	3	0	0	3	0	No	55	No	No	11
102716	PARAGON AVE	723	9	780	5	1,396	1	6	0	81	0	2 1	3	0	0	0	0	No	55	No	Yes	11
102724	PARAGON AVE	734	9	2,160	6	1,437	1	6	0	129	1	0 1	1	0	0	2	0	No	45	Yes	Yes	12
102853	PARKER DR	433	9	200	2	390	4	3	2	58	0	0 5	1	0	0	2	0	No	45	No	Yes	11
120457	330TH ST	289	9	200	2	1,421	1	4	2	99	1	1 0	3	0	0	0	0	No	55	No	No	11
121970	WASHINGTON AVE	208	9	90	0	198	4	4	2	0	0	1 0	3	0	0	0	0	No	55	No	No	11
124698	XAVIER AVE	282	9	200	2	775	3	4	2	108	1	0 1	1	0	0	0	0	No	55	No	Yes	11
2215	110TH ST	170	8	140	1	593	3	6	0	122	1	1 0	3	0	0	0	0	No	55	No	No	11
23015	JOHNSON AVE	1,002	8	250	2	863	3	6	0	0	0	2 0	3	0	0	1	0	No	55	No	No	11
29777	260TH ST	375	8	280	3	560	3	2	2	93	0	0 0	0	0	0	0	0	No	55	No	Yes	12
31635	270TH ST	135	8	330	3	1,393	1	1	4	68	0	0 0	0	0	0	0	0	No	55	No	No	11
31637	270TH ST	1,263	8	180	1	835	3	1	4	74	0	0 0	0	0	0	0	0	No	55	No	No	11
41301	330TH ST	843	8	200	2	537	3	4	2	85	0	0 1	1	0	0	1	0	No	55	No	Yes	11
42328	340TH ST	423	8	200	2	1,370	1	4	2	88	0	1 0	3	0	0	1	0	No	55	No	Yes	11
42329	340TH ST	277	8	200	2	624	3	4	2	119	1	0 0	0	0	0	1	0	No	55	No	Yes	11
70558	FAIRBANKS AVE	891	8	560	4	795	3	6	0	73	0	0 1	1	0	0	3	0	No	55	No	Yes	11
75144	GYPSUM HOLLOW RD	1,003	8	430	4	606	3	6	0	0	0	0 3	1	0	0	1	0	No	55	No	Yes	12
75145	GYPSUM HOLLOW RD	1,600	8	430	4	929	3	6	0	139	1	0 0	0	0	0	1	0	No	35	No	Yes	12
75146	GYPSUM HOLLOW RD	773	8	430	4	751	3	6	0	155	1	0 0	0	0	0	1	0	No	35	No	Yes	12
80414	375TH ST	538	8	70	0	1,205	1	4	2	199	2	2 0	3	0	0	0	0	No	55	No	No	11
85933	JOHNSON AVE	176	8	250	2	662	3	6	0	0	0	1 0	3	0	0	0	0	No	55	No	No	11
85936	JOHNSON AVE	1,002	8	250	2	863	3	6	0	0	0	2 0	3	0	0	1	0	No	55	No	No	11
100356	OLD HWY 20	380	8	4,550	6	2,107	1	10	0	79	0	0 1	1	0	0	3	0	No	45	No	No	12
101581	ORCHARD RD	741	8	480	4	2,072	1	4	2	46	0	0 3	1	0	0	1	0	No	55	No	Yes	12
101582	ORCHARD RD	805	8	480	4	1,057	1	4	2	45	0	0 4	1	0	0	2	0	No	55	No	Yes	12
102728	PARAGON AVE AND CO P59	262	8	2,160	6	1,442	1	6	0	62	0	0 1	1	0	0	0	0	No	55	No	Yes	12
102854	PARKER DR	504	8	200	2	599	3	3	2	90	0	0 1	1	0	0	1	0	No	45	No	Yes	11
102855	PARKER DR	298	8	200	2	1,506	1	6	0	522	2	1 2	3	0	0	5	0	No	35	No	Yes	11
106817	375TH ST	538	8	70	0	1,205	1	4	2	199	2	2 0	3	0	0	0	0	No	55	No	No	11
108156	RIVER DALE DR	504	8	90	0	931	3	1	4	85	0	0 10	1	0	0	0	0	No	15	No	No	11
108897	RIVERSIDE TRL	970	8	200	2	1,062	1	1	4	118	1	0 0	0	0	0	0	0	No	55	No	Yes	12
110336	SAMSON AVE	754	8	630	4	1,034	1	6	0	85	0	1 0	3	0	0	2	0	No	55	No	Yes	11
110339	SAMSON AVE	324	8	370	3	586	3	6	0	128	1	0 4	1	0	0	0	0	No	55	No	No	11
405	100TH ST	206	7	50	0	2,155	1	4	2	144	1	1 0	3	0	0	0	0	No	55	No	No	11
2213	110TH ST	374	7	140	1	711	3	6	0	0	0	2 0	3	0	0	0	0	No	55	No	No	11
31638	270TH ST	1,223	7	180	1	2,120	1	1	4	124	1	0 0	0	0	0	0	0	No	55	No	No	11
31639	270TH ST	543	7	180	1	1,911	1	1	4	120	1	0 0	0	0	0	0	0	No	55	No	No	11
33337	100TH ST	206	7	50	0	2,155	1	4	2	144	1	1 0	3	0	0	0	0	No	55	No	No	11
34976	290TH ST	853	7	350	3	1,001	1	5	2	108	1	0 0	0	0	0	2	0	No	55	No	No	11
41300	330TH ST	147	7	200	2	1,662	1	4	2	111	1	0 1	1	0	0	0	0	No	55	No	No	11
41302	330TH ST	786	7	200	2	504	3	4	2	50	0	0 0	0	0	0	1	0	No	55	No	Yes	11
70557	FAIRBANKS AVE	988	7	560	4	866	3	6	0	82	0	0 0	0	0	0	1	0	No	55	No	Yes	11
74460	GRANT AVE	244	7	2,830	6	1,017	1	10	0	66	0	0 0	0	0	0	1	0	No	55	No	No	16
85937	JOHNSON AVE	242	7	120	0	356	4	3	2	111	1	0 0	0	0	0	0	0	No	55	No	Yes	11
91983	MADISON AVE	375	7	590	4	2,391	1	4	2	44	0	0 0	0	0	0	0	0	No	55	No	No	12
102729	PARAGON AVE	321	7	840	5	2,061	1	6	0	78	0	0 1	1	0	0	1	0	No	55	No	Yes	11



GPS ID	Paved Road	Length (ft)	Risk Factor Points	Average Daily Traffic (Value)	Average Daily Traffic (Points)	Curve Radius (ft) (Value)	Curve Radius (Points)	Shoulder Width (Value)	Shoulder Width (Points)	Pavement Condition (Value)	Pavement Condition (Points)	Intersections Driveways (Value)	Intersections Driveways (Points)	K or A Crash (Value)	K or A Crash (Points)	Total Crashes	K and A	Paved Shoulder	Speed Limit	Rumble Strips	Existing Curve Chevrons	Lane Width (ft)
105572	QUAIL AVE	590	7	7,000	6	1,799	1	10	0	51	0	0 0	0	0	0	9	0	Yes	55	No	No	11
110341	SAMSON AVE	192	7	370	3	618	3	6	0	132	1	0 0	0	0	0	1	0	No	55	No	No	11
2924	115TH ST	282	6	140	1	1,017	1	6	0	148	1	1 0	3	0	0	0	0	No	55	No	No	11
20277	210TH ST	518	6	80	0	2,394	1	1	4	0	0	0 1	1	0	0	0	0	No	55	No	No	15
20281	210TH ST	312	6	120	0	345	4	3	2	91	0	0 0	0	0	0	0	0	No	55	No	Yes	11
34977	290TH ST	458	6	350	3	1,064	1	5	2	81	0	0 0	0	0	0	1	0	No	55	No	No	11
41299	330TH ST	205	6	200	2	1,027	1	4	2	126	1	0 0	0	0	0	0	0	No	55	No	No	11
70552	FAIRBANKS AVE	104	6	560	4	2,336	1	6	0	98	1	0 0	0	0	0	0	0	No	55	No	No	11
20279	210TH ST	255	3	120	0	1,591	1	3	2	70	0	0 0	0	0	0	0	0	No	55	No	No	11
24442	234TH ST	917	3	50	0	1,151	1	10	0	130	1	0 1	1	0	0	0	0	No	55	No	No	12

APPENDIX E

UNPAVED ROADWAY SAFETY COUNTERMEASURES

This appendix summarizes various **unpaved** road safety countermeasures for consideration and provides descriptions for each countermeasure.

GRAVEL ROADS CONSTRUCTION & MAINTENANCE GUIDE (FHWA 2015)

A thorough resource on unpaved roads is provided by the FHWA entitled: **Gravel Roads Construction & Maintenance Guide**, which can be found at the following website: <https://www.fhwa.dot.gov/construction/pubs/ots15002.pdf>. This guide is quoted throughout this appendix. The guide includes detailed sections on the following topics:

- Routine Maintenance and Rehabilitation
- Drainage
- Surface Gravel
- Dust Control/Stabilization
- Innovations

The summary of the guide states: “The first and most basic thing to understand in road maintenance and construction is proper shape of the cross section. The road surface must have enough crown to drain water to the shoulder, but not excessive crown which impacts roadway safety.” “When proper shape is established and good surface gravel is placed, many gravel road maintenance problems simply go away and road users are provided the best possible service from gravel roads” (*Gravel Roads Construction & Maintenance Guide, FHWA, 2015*).

UNPAVED ROADWAY SAFETY COUNTERMEASURES

The following sections provide general information on additional safety countermeasures for unpaved roadways

Maintenance of Gravel

It is important to preserve and maintain a proper road crown (four to six percent) for proper drainage to avoid ponding in potholes and/or ruts. Regular grading can help keep the roadway surface maintained, reducing water infiltration, and enhancing erosion control. According to the FHWA, “improper maintenance can lead to very quick deterioration of a gravel road, especially in wet weather”. It is also important to perform preventive maintenance to ensure that high shoulders, secondary ditches, berms, or curbs do not form. Per the FHWA, “when a gravel road develops high shoulders, it restricts the surface water from draining into the designed ditch. This creates a serious safety hazard. The time spent in eliminating a high shoulder (secondary ditch) will result in a road that is easier to maintain afterwards.”

Similar to the information provided on the paved Safety Edge, the maintenance of edge slopes on unpaved roads can allow vehicles that depart the travel lane to safely return to the roadway.

Major Rehabilitation

“At certain intervals, virtually every gravel road requires some major rehabilitation” (FHWA, 2015). This countermeasure involves not only reshaping the road surface, but the shoulder, foreslope and ditches. It is important that the redeveloped cross section be uniform and that good drainage is provided, prior to replacing the surface gravel – failure to provide proper drainage or crown in



the road surface can lead to corrugation or washboarding, which can lead to loss of vehicle control.

The use of electronic slope controls has proven useful in gravel road maintenance, rehabilitation, and basic reconstruction. It is recommended that the county consider installing electronic slope controls on existing equipment to create a proper profile for new surfaces more efficiently.

Upgrade Signs

The following countermeasures relate to potential sign upgrades on the unpaved roadway system.

Stop Signs

A low-cost safety countermeasure that could be considered along unpaved roadways includes upgrading existing stop signs. Increasing the retroreflectivity of stop signs (or replacing signs with new signs) has CMFs from 0.75 to 0.91. This improvement increases the visibility of the signs, giving drivers more time to react to the stop-controlled condition.

Curve Chevrons

This safety countermeasure includes the installation of curve chevrons placed along the outer radius of the curved roadway segment. In some instances, County Engineers have relocated older curve chevrons, when replaced on their paved system, along curves located on their unpaved system. Installing curve chevron signs has CMFs ranging from 0.75 to 0.96, and when installed in combination with other advance warning signage, has CMFs ranging from 0.59 to 0.61.

Advance Curve Warning Signs and Speed Advisory Plaques

Providing advance warning of unexpected changes in horizontal alignment in conjunction with curve chevron signs has reported CMFs ranging from 0.59 to 0.61.

Delineate Roadside Hazards with Retroreflective Markers

Retroreflective markers can be applied to roadside objects and trees, increasing the visibility of hazards and helping delineate the roadway where minimal delineation may exist.

Realign Intersection

Based on right-of-way and site conditions, this countermeasure could be particularly beneficial and should be considered where feasible at locations where there is intersection skew. The CMF for intersection geometry reconfiguration is included in the HSM and varies based on the existing skew angle. With the optimal 90-degree intersection configuration, sight triangles are maximized, crossing distance is minimized, and the intersection meets typical driver expectations.

Improve/Increase Shoulder/Lane Width

The County Engineer could consider the recommendation to improve/increase the shoulder width or lane width to accommodate traffic volumes and/or speed. This countermeasure could add safety benefits when applied properly, but could also encourage driving in excess of the speed limit, so it should be applied with caution.

Driveway Entrance Policy

It is recommended by the FHWA that, "to reduce maintenance problems [at driveways along unpaved roadways], [counties should] implement a permitting process. It should address the proper control of grade to match road edge, adequate width, and drainage."



Clear and Grub

Vegetation should be kept clear of the roadway, although a natural vegetation buffer between the roadway and any ditches or waterways can help reduce runoff velocity and provide some erosion control. This safety countermeasure reduces the hazard of a run off the road crash by reducing the number of obstructions a vehicle could impact after a lane departure.

In addition, clearing and grubbing the areas within the sight triangles of the vehicles at intersections should also be considered. This safety countermeasure increases the sight distance for vehicles prior to entering an intersection. This is particularly beneficial under two-way stop-controlled or uncontrolled situations where conflicting vehicles may not stop or yield. Per the FHWA, "there is yet another great benefit of mowing [clearing and grubbing]; by removing the standing vegetation, drifting snow will not be trapped on the roadway, resulting in drastically reduced snow removal costs."

Winter Maintenance

As salt cannot be used on gravel roads and frozen ground cannot be graded, sand is recommended for increased traction on curves and corners during winter events.

APPENDIX F

ADDITIONAL SAFETY RESOURCES

GOVERNOR'S TRAFFIC SAFETY BUREAU

215 East 7th Street, 3rd Floor, Des Moines, IA 50319-0248

PHONE: 515-725-6123 * FAX: 515-725-6133 * E-Mail: oertwig@dps.state.ia.us

MATERIALS REQUEST FORM

Name & Date of Event:

--

Audience:

Today's Date:

--	--

AVAILABLE ITEMS

Quantities are Limited

Brochures/Booklets:

- | | | |
|--|----------|--|
| 1. Is Your Child In The Right Car Seat? | 50 pack | |
| 2. Booze + Cruise = Lose | 100 pack | |
| 3. Sure, It's the Law - <i>English/Spanish</i> | 50 pack | |

Other:

- | | | |
|--|----------|--|
| 4. Sitting Up High <i>Activity Book with Safety Messages</i> | 50 pack | |
| 5. Public Guide <i>Child Restraint Law</i> English | 100 pack | |
| 6. Public Guide <i>Child Restraint Law</i> Spanish | 100 pack | |
| 7. Public Guide <i>OWI Law</i> | 100 pack | |

Please Complete to Ensure Request is Ready when Needed

Orders can be picked up or shipped.

Business ☐ Residential ☐

Agency & Name & E-mail

Address:

Phone:

Pick Up/Ship Date:

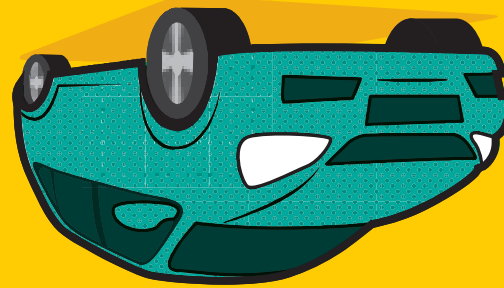
LOSE

CRUISE

BOOZE



=



+



Iowa Governor's Traffic Safety Bureau

WHAT CAN YOU DO?



- Don't drink and drive!
- Don't ride with someone who's been drinking!
- Stop your friends from driving after they've been drinking!
- Call a cab — get a ride home with someone who's sober.
- If you're under 21, just don't drink. In Iowa, it's against the law.
- And wear your seat belt — it's your best chance for survival if you're hit by a drunk driver.

IOWA'S DRUNK DRIVING LAW IS TOUGH!

ARE YOU UNDER 21? IS ONE BEER WORTH IT?

**If you're under 21 and caught driving drunk,
here's what happens:**

- At .08 you are legally drunk and subject to the penalties of the drunk driving law.
- You lose your driver's license for 180 days for a first offense.
- In most cases, you won't get a work driving permit for at least 60 days.
- If you refuse a sobriety test, you lose your license for one year with no work driving permit for 90 days.
- For second and subsequent offenses, you lose your license for at least a year and won't get a work permit, period!
- Upon arrest for a second or subsequent offense, or for driving while revoked, your car can be impounded.

**If you're under 21 and caught driving with a blood alcohol
content of as little as .02, here's what happens:**

- You lose your driver's license for 60 days for first-time offenders — two months without driving!
- You lose your driver's license for 90 days for subsequent offenses — three months without driving!
- No temporary permits for any reason!
- Alcohol is alcohol, whether it's beer, wine or liquor.
- For most people, .02 is as little as one beer, one glass of wine or one mixed drink — for some even less!

DRIVING WHILE REVOKED

A person who drives while his or her license is revoked under the OWI chapter (whether the revocation is administrative or court ordered, and whether for an OWI or for a .02 violation) commits a serious misdemeanor and must pay a fine of \$1,000. Law enforcement officers may impound vehicles if the driver's license is revoked for an OWI. If such a driver is convicted of a second or subsequent offense while driving with a revoked license, the vehicle must be seized and forfeited to the state.

The owner of a vehicle who lends the vehicle to a person whose license is revoked for an OWI commits a simple misdemeanor and is jointly liable for any damages the driver causes if the owner knew, should have known, or gave consent to the operation of the vehicle by a driver with a revoked license.

VEHICLE IMPOUNDMENT/IMMOBILIZATION

A person arrested for a second or subsequent OWI, or for driving while a license is revoked for an OWI, may have the motor vehicle seized and impounded immediately upon arrest. The impoundment (or immobilization) continues for at least 180 days, or until the driver's license revocation is completed — whichever period is longer. If the vehicle is not impounded at the time of arrest, it must be impounded or immobilized upon conviction for the second or subsequent OWI offense. If a vehicle is operated in violation of an order of impoundment or immobilization, it shall be seized and forfeited to the state. Operation of the vehicle is a serious misdemeanor.

REINSTATING A DRIVER'S LICENSE

If a motor vehicle license or non-resident operating privilege has been revoked for any OWI offense under chapter 321J (whether as a result of a court order or administrative action), the license or privilege may not be reinstated until the person:

- Pays a \$200 civil penalty.
- Presents proof of completion of a course for driving under the influence.
- Presents proof of completion of a substance abuse evaluation and treatment or rehabilitation services.
- Complies with financial responsibility laws, if applicable.
- Complies with ignition interlock requirements, if applicable.



DRUNK DRIVING. OVER THE LIMIT. UNDER ARREST.

www.iowagtsb.org • Phone: (515) 725-6123 • Fax: (515) 725-6133

A large graphic featuring a red diamond-shaped sign with a white border. At the top of the sign is a black and white sphere with a white circle in the center containing the number ".08". The text on the sign reads "Iowa's OWI Law" in large white letters, followed by "Operating a motor vehicle while intoxicated or drugged" in smaller white letters. The background of the graphic is split horizontally, with white on top and black on bottom.

Iowa's OWI Law
Operating a motor vehicle
while intoxicated
or drugged

EFFECTIVE JULY 1, 2003
UPDATED JULY 1, 2013

It is unlawful to operate a motor vehicle in Iowa in any of the following conditions:

- 1. While under the influence of an alcoholic beverage, other drugs or combination of such substances.
- 2. While having a blood/breath/urine alcohol concentration of .08 or more.
- 3. While having any amount of a controlled substance in one's body.

Iowa's implied consent law means that any person who operates a motor vehicle in the state agrees to have a blood, breath and/or urine test performed to determine alcohol level or presence of drugs whenever a peace officer has reasonable grounds to believe the person is operating in violation of the law.

CRIMINAL PENALTIES FOR OWI

First Offense A serious misdemeanor, punishable by up to one year in jail and a fine of \$1,250, or both. The minimum jail time is 48 hours, which may be served in an OWI program with law enforcement security. The judge may waive up to \$625 of the fine if the crime did not result in a personal injury or property damage. As an alternative to a portion or all of the fine, the court may order the person to perform unpaid community service. These offenders must also be ordered to complete a substance abuse evaluation and treatment course for drinking drivers, and in some cases, a reality education substance abuse prevention program.

Second Offense An aggravated misdemeanor, punishable by up to two years in prison. A minimum of seven days in jail must be served. A fine of \$1,875 to \$6,250 must be paid. These offenders must also be ordered to complete a substance abuse evaluation and treatment course for drinking drivers, and in some cases, a reality education substance abuse prevention program.

Third or Subsequent Offense A Class "D" felony, punishable by imprisonment up to five years and a fine of \$3,125 to \$9,375. A minimum of 30 days in jail must be served. These offenders must also be ordered to complete a substance abuse evaluation and treatment course for drinking drivers, and in some cases, a reality education substance abuse prevention program.

NOTE: OWI convictions and deferred judgments that occurred anywhere in the United States within the preceding 12 years will count in determining whether the offense charged is a second or third offense. Also, deferred judgments, deferred sentences or probation without service of the mandatory minimum period of incarceration may be granted in an OWI case only if the defendant:

- Has never been previously convicted or received a deferred judgment for OWI anywhere in the United States.
- At the time of arrest, agreed to take a chemical test and had a test result of no higher than .15.
- Did not cause injury to another person by driving while intoxicated.

All persons convicted must undergo a substance abuse evaluation (at the offender's expense) prior to sentencing, and the court must order the defendant to follow the recommendations of the evaluation.

Victims may receive restitution for all damages caused by a defendant. Public agencies may receive up to \$500 for costs incurred as a result of a defendant's crime.

CRIMINAL PENALTIES FOR OWI CAUSING DEATH OR SERIOUS INJURY

OWI which causes the death of another person is a Class "B" felony, punishable by up to 25 years in prison. This sentence cannot be suspended, and a defendant cannot be released on bail before sentencing, or while on appeal. There is no fine, but victim restitution of \$150,000 will be ordered. OWI which causes a serious injury to another person is a class "D" felony, punishable by up to five years in prison. This sentence cannot be suspended. A fine of \$750 to \$7,500 may be imposed, and victim restitution may be ordered.

DRIVERS' LICENSE REVOCATIONS

Administrative — Test Failure:

First Offense When a chemical test indicates an alcohol level of .08 or more or the presence of a controlled substance, and the person has had no OWI-related revocations in the previous 12 years..... 180 days
May apply for a temporary restricted license. If a crash occurred, or if the BAC level was .15 or greater, you must wait 30 days. You must install an ignition interlock device if the BAC level is .10 or greater, or if a crash occurred.

Second or more One or more revocations in the previous 12 years.....1 year
Not eligible for temporary restricted license for 45 days. In all cases, an ignition interlock must be installed for at least a year.

Administrative — Test Refusal (includes refusal of a urine or blood test if the officer requests such a test after a person has submitted a breath test):

First Offense When a chemical test is refused, and the person has had no OWI-related revocations in the previous 12 years 1 year
May apply for a temporary restricted license after the first 90 days if an ignition interlock device is installed on all vehicles and a plea of guilty is entered.

Second or more One or more revocations in the previous 12 years 2 years
May apply for a temporary restricted license after 90 days, if ignition interlock device is installed on all vehicles. In all cases, an ignition interlock must be installed for at least one year.

Administrative — Driver Under 18:

If a driver is under the age of 18 and his or her license or operating privileges are revoked administratively or by a court order, the revocation continues until the revocation expires or until the person reaches 18, whichever is later.

Upon Conviction for OWI — If Not Otherwise Revoked Administratively:

First Offense Upon conviction, if no convictions or revocations in the preceding 12 years 1 year; 180 days if evidence of a test.
May apply for a temporary restricted license. If a crash occurred, or if the BAC level was .15 or greater, you must wait 30 days. You must install an ignition interlock device if the BAC level is .10 or greater, or if a crash occurred. You must wait 90 days if you refused to test.

Second Offense One or more revocations in the preceding 12 years 2 years; 1 year if evidence of a test.
May apply for a temporary restricted license after 90 days if there is no evidence of a test, if ignition interlock device is installed on all vehicles. In all cases, an ignition interlock must be installed for at least one year.

Deferred If license is not otherwise revoked and court defers judgment..... 30 – 90 days
May apply for a temporary restricted license. If a crash occurred, or if the BAC level was .15 or greater, you must wait 30 days. You must install an ignition interlock device if the BAC level is .10 or greater, or if a crash occurred. You must wait 90 days if you refused to test.
If under 21, you are ineligible for temporary restricted license until 60 days have passed.

Administrative — in Addition to Other Revocations:

Third Offense — Upon Conviction: 6 years
May apply for a temporary restricted license after one year if ignition interlock device is installed on all vehicles. In all cases, an ignition interlock must be installed for at least one year.

Court Ordered — In Addition to Other Administrative or Court-Ordered Revocations:

Any level of offense involving serious injury caused by OWI..... 1 year in addition to any other revocation.
May apply for a temporary restricted license when otherwise permitted by other revocation; ignition interlock device must be installed on all vehicles.

Any level of offense involving a death caused by OWI..... 6 years
May apply for a temporary restricted license after two years if ignition interlock device is installed on all vehicles.

.02/"ZERO TOLERANCE" ADMINISTRATIVE LICENSE REVOCATIONS FOR DRIVERS UNDER 21

The license of a person under 21 who submits to a chemical test which indicates an alcohol level of .02 or more, but less than .08, will be revoked for 60 days on a first violation and 90 days on subsequent violations. If such a person is suspected of operating with an alcohol level of .02 or more and refuses chemical testing, the license revocation will be one year on a first violation and two years on a second or subsequent violation. These revocations, .02/"zero tolerance" revocations, are administrative and are not dependent upon criminal charges being filed. If a license is revoked for a .02/"zero tolerance" violation, the driver is not eligible for a temporary restricted license at any time during the revocation.

A GUIDE TO THE IOWA CHILD RESTRAINT LAW

Iowa Code 321.446, Data Code 198a - as of July 2010

Key Points:

- A child under 1 year old and weighing less than 20 lbs. must be secured in a rear-facing child restraint system
- A child age 1 up to 6 years old must be secured in a child restraint system (a safety seat or booster seat--NOT a seat belt)
- A child from age 6 up to age 11 must be secured in a child restraint system or by a safety belt
- Rear seat occupants up to age 18 must be secured by a safety belt

A "child restraint system" is a specially designed seating system, including an internal harness or a belt positioning booster seat that meets federal motor vehicle safety standards.

- The misdemeanor fine is \$100.00, plus costs (non-moving violation) totaling at least \$195.00
- The law applies to both residents and non-residents of Iowa
- The child restraint system must be used in accordance with the manufacturer's instructions
- The child must be secured in the child restraint and the child restraint must be properly secured to the vehicle
- Non-use of a child restraint is probable cause to stop a vehicle
- An officer may investigate a suspected violation
- For unrestrained passengers age 0-13, the driver receives the citation, and for unrestrained passengers 14-17, the passenger receives the citation
- **1st offense citation will not result in conviction if driver "produces in court" proof of acquisition of child restraint**

Exceptions:

- Children certified by a physician as having a medical, physical or mental disability making restraint use inadvisable
- Children on bus, including a school bus
- Children riding on motorcycles
- Children riding in vehicles manufactured before 1966
- Children transported in authorized emergency vehicles
- Children transported by peace officers on official duty
- Children riding in motor homes except if riding in the front passenger seat (where they must be restrained)
- Children for whom a seat belt is not available due to all other belts being used (example: 4th child in back seat with only 3 belts)

This is only a guide, provided through the courtesy of

**Iowa Governor's Traffic Safety Bureau
Department of Public Safety**

Produced with Federal Highway Safety Funds 02/14 20M

A GUIDE TO SAFELY TRANSPORTING CHILDREN IN A MOVING VEHICLE

COMMON CHILD SAFETY SEAT MISUSE:

- Latch System used incorrectly
- Not securing top tether strap for forward facing seats
- Not buckling child into restraint
- Not securely anchoring the child restraint to the vehicle
- Improper seat for child's age and size
- Use of after-market products
- Harness retainer clip not at armpit level
- Loose harness straps

To graduate to an adult belt -- a child must pass the Belt Fit Test. To be able to sit with their back/buttocks against the seat, their knees bent at the edge of the seat and their feet touch the floor. The belt system must be snug across the center of the child's chest and across their lap at the hips.

COMMON SAFETY BELT MISUSED FOR CHILDREN:

- Lap belt up on abdomen
- Shoulder belt crossing on a child's face or neck
- Shoulder belt behind back
- Shoulder belt under their arm

**For your Child's sake, go above and beyond Iowa's
Child Passenger Safety Law!**

IOWA LAW

Children must ride in an appropriate rear facing seat until one year of age and at least 20 pounds.

Children must ride in a child safety seat or booster through the age of 5. (Seats must be used in accordance with manufacturer's directions)

Children must be in a booster seat or seat belt between 6 and 11 years old, regardless of their seating position within a vehicle.

Rear seat occupants up to age 18 must be secured by a safety belt.

BEST PRACTICE

Children should ride in an appropriate rear facing seat until the maximum weight limit of the seat is reached.

A child should be restrained in a 5-point harness until the maximum weight limit for the seat is reached. This is usually 50-65 pounds, although some are now 80-90 pounds.

At maximum harness weight a child should graduate into a booster seat. A child should ride in a booster until they pass the **Belt Fit Test** mentioned above.

For further information on child restraints, contact the

**Iowa Child Passenger Safety Helpline
1-800-258-6419**

For Certified Child Passenger Technicians & Child Restraint Checks

Visit this Website: www.blankchildrens.org/cps

Use of Electronic Communication Devices While Driving & Penalties		
Code Section & Applicable Motorist		Fine
321.178(2)(a) 16-18 yrs. – Work/Family Permits Class C Restriction “6” Primary Enforcement		\$30
-Shall not use electronic communication device or entertainment device while driving a motor vehicle.		
-May use when at complete stop off the traveled road.		
-May use electronic devices permanently installed in a motor vehicle or portable device operated through permanently installed equipment.		
321.180B(6)(a) Instruction Permit or Intermediate DL Class C or Y Restriction “2” Primary Enforcement		\$50
-Shall not use electronic communication device or entertainment device while driving a motor vehicle.		
-May use when at complete stop off the traveled road.		
-May use electronic devices permanently installed in a motor vehicle or portable device operated through permanently installed equipment.		
321.194(1)(c) 14-18 yrs. Special Minor’s License Class C Restriction “7” Primary Enforcement		\$50
-Shall not use electronic communication device or entertainment device while driving a motor vehicle.		
-May use when at complete stop off the traveled road.		
-May use electronic devices permanently installed in a motor vehicle or portable device operated through permanently installed equipment.		
321.276 Use of Electronic Messaging While Driving All Classes/Drivers Primary Enforcement		\$30
-Shall not use any portable electronic device to manually write, send, or view a text, instant message, email, internet site, social media or game while driving.		
-Write, send, and view include manual entry, transmission, or retrieval of electronic messages and include playing, browsing, or accessing a message.		
-May write, send or view an electronic message when at a complete stop off the traveled portion of the roadway.		
-May use voice-operated or hands-free device without the use of either hand except to activate or deactivate a feature or function.		
-May use wireless communication device as part of a digital dispatch system.		
-May use a GPS or navigation system.		
-May engage in a call, including selecting or entering a telephone number or name in a hand-held mobile telephone.		
<i>Persons Exempt from Restriction on writing, sending, or viewing an electronic message:</i> member of a public safety agency performing official duties; health care professional in the course of an emergency situation; individuals receiving safety-related info including emergency, traffic, or weather alerts.		

Use of Electronic Communication Devices While Driving & Penalties
Frequently Asked Questions:
Q) What is a “hand-held electronic communication device”?
A) Iowa code defines a “hand-held electronic communication device” as a mobile telephone or other portable electronic communication device capable of being used to write, send, or view an electronic message, and includes devices temporarily mounted in the vehicle unless the device is voice-operated or hands-free. It does not include a voice-operated or hands-free device which allows the user to write, send or view an electronic message without the use of either hand except to activate or deactivate a feature or function, or a wireless digital dispatch system.
Q) What is an “electronic message”?
A) Iowa code defines “electronic message” as an image visible on the screen of a hand-held electronic communication device and includes a text message, an instant message, email, an internet site, a social media application, or a game.
Q) Can I pull over an adult, fully licensed driver for using their phone as a GPS or navigation system?
A) No. However, If the use of the device as a navigation system results in erratic driving and lane deviations, that can support a stop of the vehicle for other violations.
Q) Can I pull over an adult, fully licensed driver for talking on a cell phone while driving?
A) No. Iowa code does not prohibit an adult, fully licensed driver from engaging in a telephone call, or activating or deactivating a feature or function of the device.
Q) Can I pull over an adult, fully licensed driver for texting, playing, browsing, accessing or viewing an electronic message?
A) Yes. Using an electronic device while driving is a primary offense for all drivers. It is imperative that you observe and document the driver’s use of the phone, multiple key strokes, eyes away from the roadway, and/or any erratic driving to overcome a claim of dialing a phone number or activating or deactivating a function of the device. This will likely require some sustained observation. Reasonable suspicion or probable cause to make a traffic stop would also permit requesting consent to view the phone. Taking and inspecting the phone without consent requires a search warrant.
Q) Can I pull over a 16-year-old who is talking on the phone?
A) Yes. Laws applicable to drivers within the GDL system or those with a minor’s work or school permit are prohibited from using electronic devices entirely, unless the vehicle is stopped and off the traveled portion of the roadway or the device is permanently installed in the vehicle or operated through permanently installed equipment.

Child Passenger Safety





A PARENT'S PRIMER

When you're an expectant mother, it's important to always wear your seat belt to protect you and your unborn child. Wear the lap belt across your hips and below your belly with the shoulder belt across your chest (between your breasts). Once your baby is born, follow these important safety steps.

GROWING UP SAFE: It's a four-step process.

As children grow, how they sit in your car, truck or SUV should change.

Save your child from injury or death by observing all four steps:

- 1 REAR-FACING SEATS**  For the best possible protection keep infants in the back seat, in rear-facing child safety seats, as long as possible up to the height or weight limit of the particular seat. At a minimum, keep infants rear-facing until a minimum of age 1 **and** at least 20 pounds.
- 2 FORWARD-FACING SEATS**  When children outgrow their rear-facing seats (at a minimum age 1 **and** at least 20 pounds) they should ride in forward-facing child safety seats, in the back seat, until they reach the upper weight or height limit of the particular seat (usually around age 4 and 40 pounds).
- 3 BOOSTER SEATS**  Once children outgrow their forward-facing seats (usually around age 4 and 40 pounds), they should ride in booster seats, in the back seat, until the vehicle seat belts fit properly. Seat belts fit properly when the lap belt lays across the upper thighs and the shoulder belt fits across the chest (usually at age 8 or when they are 4'9" tall).
- 4 SEAT BELTS**  When children outgrow their booster seats, (usually at age 8 or when they are 4'9" tall) they can use the adult seat belt in the back seat, if it fits properly (lap belt lays across the upper thighs and the shoulder belt fits across the chest).

Get Help!

ON THE WEB

Go to www.nhtsa.gov and choose Child Safety Seat Information from the menu or click on the child passenger safety icon. The site includes child safety seat installation tips, product ratings, recalls, and other useful information.

BY PHONE

For more information about child safety seats, booster seats, inspection/fitting stations in your area, seat belts, air bags, and

other highway safety issues, call the DOT Vehicle Safety Hotline at: 1-888-327-4236.

NEAR YOU

A certified child passenger safety technician can check your installation and answer questions. To find a technician or an inspection station near you, go to www.nhtsa.gov, click on the child passenger safety icon, and then click on the Fitting/Inspection Station link or go to www.seatcheck.org.

REMEMBER: All children under 13 should ride in the back seat.

Always read the child restraint instructions and the vehicle owner's manual.



GUIDELINES FOR SECTION 405d FUNDING PROPOSALS

Governor's Traffic Safety Bureau - Iowa Department of Public Safety

January 2016

The Iowa Governor's Traffic Safety Bureau (GTSB) administers the federally funded Section 402 Highway Safety Program authorized on December 4, 2015, when President Obama signed into law P.L. 114-94, the Fixing America's Surface Transportation (FAST) Act. The FAST Act authorizes the federal surface transportation programs for highways, highway safety and transit. Federal highway safety programs are administered by the National Highway Traffic Safety Administration, an agency of the U.S. Department of Transportation established in 1966 to combat the growing number of traffic related deaths and injuries. The Federal 405d Program is designed to help states, counties and communities initiate programs to combat the problem of impaired driving. Impaired driving and non-use of restraints are the leading causes of death and injury in traffic crashes in both Iowa and the Nation.

While 405d monies focus on impaired driving, other traffic safety activities, such as enforcement of seat belt, speed and stop violations are included. Applicants are encouraged to "leverage" funds from the GTSB with staff, financial or other resources they can contribute to a proposed project. Section 405d is a one-year program with a new application required annually. Proposals must be submitted by February 29 for consideration for a program that will begin the following October 1st.

To qualify for Section 405d funding, agencies must be in one of Iowa's designated Top 40 Problem Counties determined annually by an in-depth traffic data analysis of alcohol-related crashes, fatalities and injuries and OWI revocations. Agencies in counties ranked 1-22 are eligible regardless of population. Agencies in counties ranked 23-40 must be in cities with a population of 5,000 or more unless their jurisdiction is countywide.

Section 405d programs may include elements such as directed overtime enforcement, educational presentations, equipment, training and/or public information campaigns. Enforcement agencies requesting overtime are required to direct that overtime enforcement to high-risk times (typically evening) and at high-risk locations for impaired driving crashes and to participate in two multi-agency enforcement efforts during the program. With a focus on impaired driving prevention, agencies are also required to conduct public awareness through media releases, news articles and/or educational presentations.

AGENCY'S CURRENT RESOURCES

If your agency is asking for overtime for traffic enforcement, you must provide the number of sworn officers in your department and the average overtime rate of pay. If your agency is asking for any equipment, you must complete the Equipment Information Section of the application.

REQUESTED PROGRAM ELEMENTS/BUDGET

This section tells us exactly what your agency is requesting to carry out your proposed program. These elements, if approved, will make up your contract budget. While an estimate, be as specific as possible. Estimated project costs are categorized as follows:

1. Personal Services - Overtime and training-related travel expenses.
2. Commodities - Educational materials acquired and consumed specifically for the program. They must include impaired driving prevention information pre-approved by the Bureau.

3. Equipment - Cost of equipment provided for the grantee. Preliminary breath testers (PBTs) and in-car video cameras are examples of equipment.

COMMITMENT STATEMENTS

If approved, your agency will commit to *at least* the first statement in this section of the application and then to all other statements that apply. **Statement 1** is a commitment to conduct the program activities and provide the required reports in a timely manner as well as an annual report at the end of the program year. **Statements 2-4** apply only to law enforcement agencies committing to traffic enforcement, public education and conducting safety belt surveys. **Statements 5 and 6** relate to obtaining prior approvals for impaired driving prevention information to be printed on educational materials and for any out-of-state travel taken in support of the program. **Statement 7** is a commitment to provide an HSP-3 form and a digital photo of any equipment purchased.

SIGNATURE

The agency head or other person with signatory authority must sign the completed application.

Examples of Items Commonly Funded under the Section 405d Program

1. Overtime for educational presentations on impaired driving
2. Overtime for enforcement or dispatch services
3. Training-related travel
4. Educational materials with impaired driving prevention information
5. In-car video cameras
6. PBTs
7. Fatal Vision Goggles

Examples of Items NOT Funded under the Section 405d Program

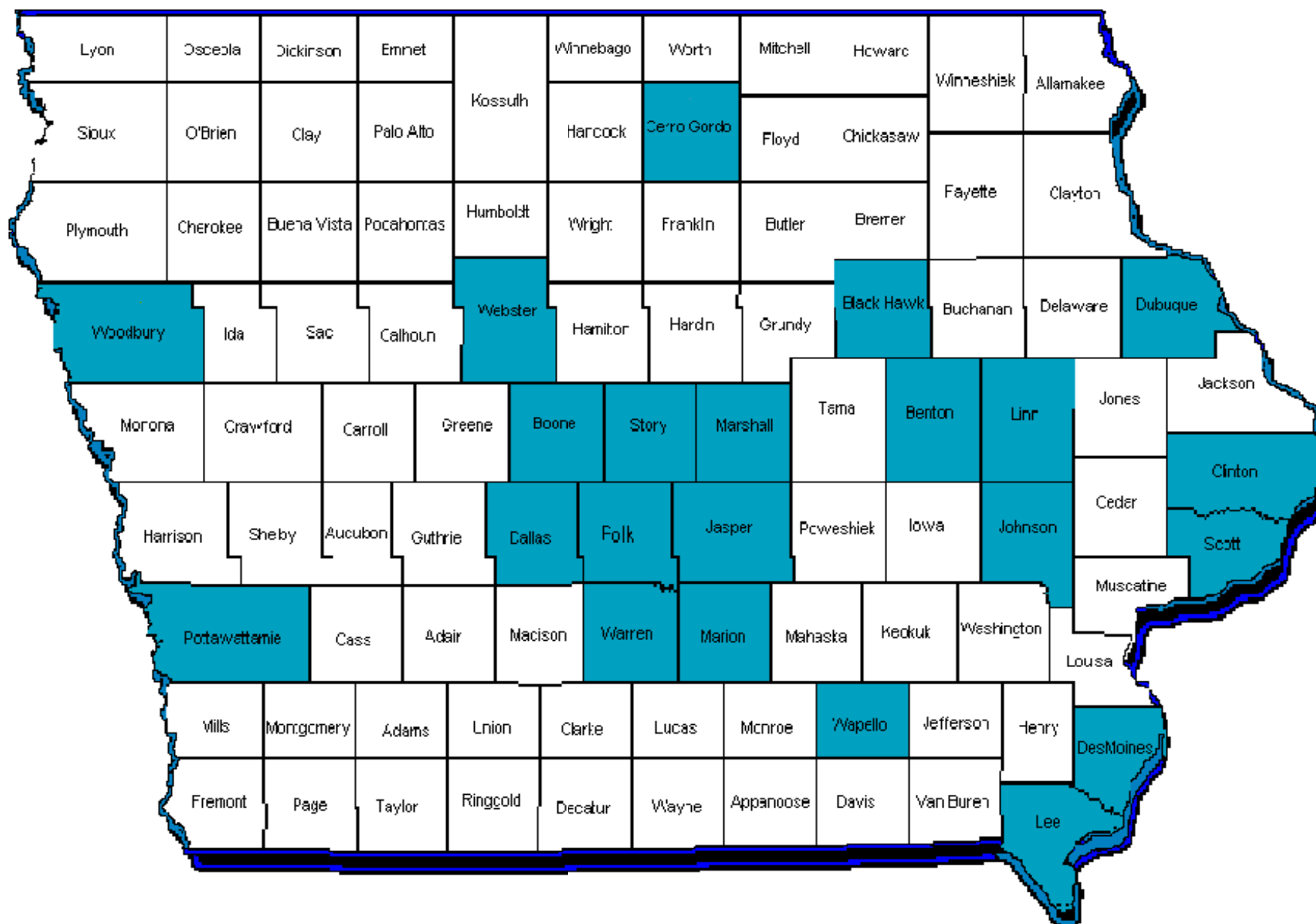
1. Research
2. Radar or lidar units
3. Office furniture
4. Bicycle helmets
5. Child safety seats
6. Alcoholic beverages
7. Signs or roadway hardware
8. Overtime for seat belt surveys
9. Vehicles (cars, motorcycles, boats)
10. Salary for existing personnel (considered supplanting)
11. Entertainment or refreshment (coffee, donuts) expenses
12. Any equipment ordered prior to the effective date of the contract
13. Any equipment received after the expiration date of the contract.
14. Equipment to replace a GTSB-funded piece of equipment less than 5 years old.

For Further Information/Assistance, Contact the Governor's Traffic Safety Bureau at 515-725-6121

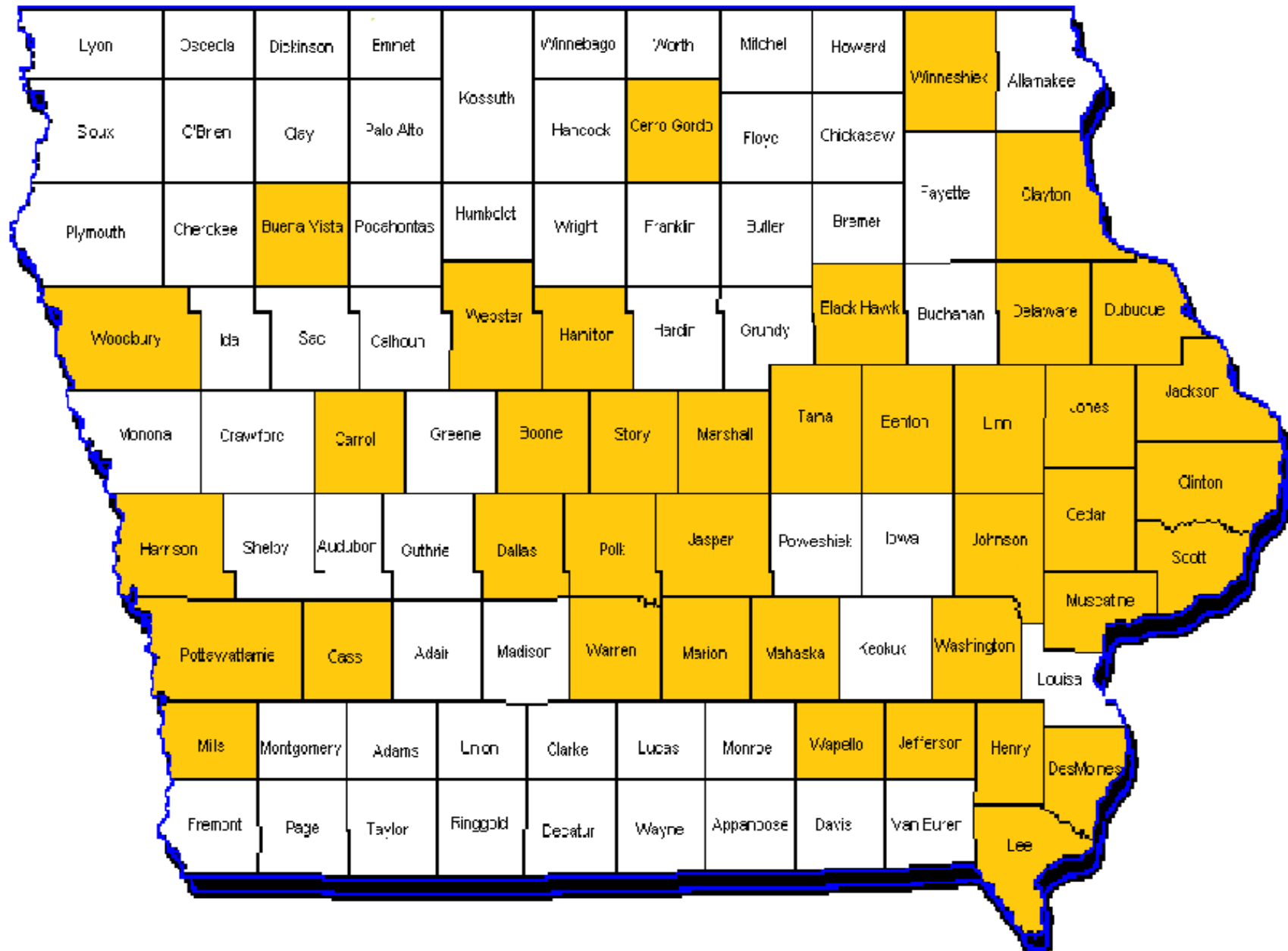
**Applications must be submitted On-line via
www.iowagrants.gov by Midnight, February 29th**

**Iowa Governor's Traffic Safety Bureau
215 East 7th Street, 3rd Floor
Des Moines, IA 50319-0248**

Iowa's Top 22 Problem Identification Counties 402 Grant FFY 2017



Iowa's Top 40 Alcohol-Problem Counties 405d Grant FFY 2017



Iowa Governor's Traffic Safety Bureau

www.iowagrants.org

Section 405d - Impaired Driving Countermeasures Grant Application

Contract Period: October 1, 2016 through September 30, 2017

Agency Information: *This information is needed for and will become part of the contract for the grant, if awarded.*

Department _____

How your Department will appear in the grant if awarded; i.e., Podunk Police Department or Big City Sheriff's Office

Dept. Head _____

Provide Title/First Name/Last Name of the Head of your Department (Chief, Sheriff, Director, etc.)

Project Administrator Title/FirstName/Last Name: _____

The person who will be responsible for project activities if a grant is awarded

Department Head Email Address: _____

Project Administrator Email Address: _____

Notifications regarding the grant will be sent to the above address

Address: _____

IA

Department mailing address (include PO Box if one is used) Enter the City, State & Zip Code

Phone # _____

FAX # _____

Payment Information: *This information will be used to reimburse your agency for grant expenses, if awarded.*

Reimbursement checks made out to (county/city/agency): _____

Payment Address (if different from agency): _____

First/Last Name of Finance Person: _____

A contact for financial matters/the person who will prepare reimbursement claims

Phone/Email for Financial Contact (optional): _____

Personnel Information: *This information is required if overtime funding is requested.*

Personnel: # of full-time officers _____

Average OT pay rate \$ _____

of paid part-time or reserve officers _____

Average pay rate \$ _____

Requested Program Elements: Number (hours/items) in the left hand column; dollar amount right hand column:

_____ Overtime for traffic enforcement with a focus on alcohol/drug violations	\$ _____
_____ Overtime for dispatch services to support enforcement efforts	\$ _____
_____ Overtime for educational presentations on impaired driving prevention	\$ _____
_____ Educational print materials - explain type/use in narrative on Page 2	\$ _____
_____ DPS Approved Preliminary Breath Tester(s) - limit of \$450 per unit	\$ _____
_____ In-car video camera - limit of \$4,500 per unit	\$ _____
_____ Fatal Vision goggles - limit of \$850 per set	\$ _____
_____ Other _____	\$ _____

Total Funding Amount Requested _____

\$ _____

Equipment Request: *If equipment is requested, an Equipment Information Form (page 3) is required to be completed.*

Minority Impact Statement: *The State of Iowa requires this for all funding applications. Separate form is attached.*

Section 405d - Impaired Driving Countermeasures Grant Application

Project Description: Detail Activities & Objectives that focus on impaired driving education and/or crash reduction.

Provide specific program activities your agency will conduct as part of your impaired driving prevention program. *Examples: officers will conduct overtime enforcement during times and at locations identified as high-risk for impaired driving crashes and that overtime will be directed at removing impaired drivers from our roads; staff will provide impaired driving prevention educational presentations to local junior high/high schools; was plan to have five traffic officers attend the ARIDE training and other traffic enforcement related training which might include the Annual GTSB Conference*

Commitment Statements - If approved, our agency commits to:

- 1) Conduct traffic enforcement directed at alcohol/drug-related and other traffic violations at high-risk locations and during high-risk times for impaired driving crashes.
- 2) Conduct at least two special enforcement projects one of which will be done at night.
- 3) Conduct at least twelve public information/education activities directed at impaired driving prevention.
- 4) Conduct program activities between 10/1/14 - 9/30/15 and submit monthly reports and an annual

The following Commitment Statements apply only if the corresponding program element(s) are requested:

- 5) If funding is received for educational print materials, they will include information on impaired driving prevention in support of the program and be pre-approved prior to ordering, printing and distributing.
- 6) If funding is received for program-related travel, a travel request will be submitted 6 weeks prior to the travel and a post-travel report must be submitted within 2 weeks after the travel.
- 7) If funding is received for equipment, it will be purchased to support the program and an HSP-3 form and a digital photograph of the equipment showing the serial number will be submitted.

Signature of Agency Head

Signature of Mayor (Police Depts Only)

Please **Type** Above Title/First and Last Name

Please **Type** Above First & Last Name**Applications MUST be received in the GTSB office by February 27, 2015****Faxes will be accepted, but original signature applications must also be mailed to:****Governor's Traffic Safety Bureau, 215 East 7th St., Des Moines, IA 50319-0248****FAX # 515-725-6133**

GTSB Equipment Information Form

Complete and Submit with Funding Application if Equipment is being Requested

Agency: _____
Please enter your agency's name in case this sheet gets separated from rest of your application

Number of Marked Vehicles in Department's Fleet: _____
Number of Unmarked Vehicles in Department's Fleet: _____
Number of Working Radars* Owned by Department: _____
Number of Working PBTs* Owned by Department: _____
Number of Working Lidars* Owned by Department: _____
Number of Working In-car Cameras Owned by Dept.: _____

***NHTSA/DPS Approved Equipment Lists on GTSB website www.iowagtsb.org. Not required for cameras.**

Is requested equipment to replace GTSB-funded equipment? Yes No

If yes, please list the equipment and the date of it's purchase:

<u>Equipment:</u>	<u>Date Purchased:</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Is the equipment requested an upgrade of existing equipment? Yes No

If yes, give reason(s) why upgrade is needed: *Example: Upgrading from analog to digital.*

NHTSA Program Management R11/07 §18.32 Equipment...(c) Use. (1) Equipment shall be used by the grantee in the program for which it was acquired as long as needed, whether or not the project continues to be supported by Federal funds. When no longer needed for the original program, the equipment may be used in other activities currently or previously supported by a Federal agency. (2) The grantee shall also make equipment available for use on other projects currently or previously supported by the Federal Government, provided such use does not interfere with the project for which it was originally acquired. (3) The grantee must not use equipment to provide services for a fee unless specifically permitted by Federal statute. (4) When acquiring replacement equipment, the grantee may use the equipment to be replaced as a trade-in or sell the property and use the proceeds to offset the cost of the replacement property, subject to the approval of the awarding agency. (d) Management requirements. (1) Property records must be maintained that include a description of the property, a serial number or other ID number, the source of property, who holds title, the acquisition date, and the cost, percentage of Federal participation in the cost, the location, use and condition of the property and any ultimate disposition data including date of disposal and sale price of property. (2) A physical inventory of the property must be taken and the result reconciled with the property records at least once every two years. (3) A control system must be developed to ensure adequate safeguards to prevent loss, damage, or theft of the property. Any loss, damage or theft shall be investigated. (4) Adequate maintenance procedures must be developed to keep the property in good condition. (e) Disposition. Items of less than \$5,000 may be retained, sold or otherwise disposed of with no further obligation to the awarding agency. Equipment must be tagged with a GTSB-provided equipment tag and made available for periodic inspection by the GTSB.

Allowable 405d Equipment Includes: In-Car Video Camera (\$4,500); Fatal Vision Goggles (\$850); PBT (\$450)

Equipment Not Allowed for Section 405d Funding: Radar units; Lidar units; Speed Trailers; Bicycles; Helmets; Child Restraints, Office Furniture; Signs; Roadway Hardware; Vehicles

GUIDELINES FOR SECTION 402 FUNDING PROPOSALS

Governor's Traffic Safety Bureau - Iowa Department of Public Safety

January 2016

The Iowa Governor's Traffic Safety Bureau (GTSB) administers the federally funded Section 402 Highway Safety Program authorized on December 4, 2015, when President Obama signed into law P.L. 114-94, the Fixing America's Surface Transportation (FAST) Act. The FAST Act authorizes the federal surface transportation programs for highways, highway safety and transit. Federal highway safety programs are administered by the National Highway Traffic Safety Administration, an agency of the U.S. Department of Transportation established in 1966 to combat the growing number of traffic related deaths and injuries.

The federal 402 Program is designed to help states, counties and communities initiate programs to address traffic safety problems. Applicants are encouraged to "leverage" funds requested from the GTSB with staff, financial or other resources they can contribute to the proposed project. Traffic safety issues that qualify for 402 funding are: alcohol, occupant protection, police traffic services, speed, emergency medical services, traffic records, roadway safety (engineering), motorcycles and pedestrian/bicycle safety. Project proposals may include activities in any or all of these areas. Section 402 programs are funded through a one-year contract between the GTSB and the requesting agency. Funds are only provided via reimbursements. Agencies must first pay all program costs and then submit claims for reimbursement. Claims are usually done monthly. Upon receipt of a properly completed reimbursement claim, the GTSB should be able to provide reimbursement within 90 days.

To qualify for Section 402 funding, agencies must be in a county designated as one of Iowa's Top 22 Problem Counties and have a city population of 5,000 or greater. These are determined each year by an in-depth analysis of Iowa's traffic safety crashes, fatalities, injuries, VMT and OWI data. Please contact the Bureau to ensure your agency qualifies for Section 402 funding before submitting an application.

The agency head or suitable authority must sign the funding proposal. Proposals must be received by the GTSB before March 1st for consideration in the program year beginning the following October 1st.

These instructions provide potential contractors with the appropriate information to complete a Section 402 funding application for submission to the Governor's Traffic Safety Bureau.

PROBLEM STATEMENT

The problem statement should briefly describe the highway safety problem(s) you plan to address. Remember the nine highway safety emphasis areas noted above are the primary focus of the 402 Program. If possible, include traffic data such as citations, crashes or seat belt usage rates.

GOAL OBJECTIVES/PERFORMANCE MEASURES

Note your goal objective(s). The best objectives answer the question: What results will be attained and how will they be measured (numerically measurable outcomes are desirable). Objectives should be specific, measurable, action-orientated and reasonable.

ACTIVITIES

Program activities should provide the methods by which you propose to achieve your objectives. What activities will you undertake to accomplish your goals? Activities might include directed overtime enforcement, educational presentations, training or workshop sessions or public information endeavors. Be as specific as possible so it is clear how they will impact your identified highway safety problem(s).

AGENCY'S CURRENT RESOURCES

If your agency is asking for overtime in your application, you need to note the number of sworn officers in your department and the average overtime rate of pay.

If you are asking for equipment in your application, you must complete the last page of the application which is the Equipment Information Form.

REQUESTED PROGRAM ELEMENTS/BUDGET

This section tells us exactly what your agency is requesting to carry out the activities proposed in your application. These elements, if approved, will make up your contract budget. While a proposed budget for a program is an estimate, the figures should be as specific as possible. Estimated project costs are categorized in these four cost categories:

1. Personal Services – Overtime, salaries and training-related travel expenses.
2. Commodities - Costs of educational materials acquired and consumed specifically for the purpose of the program. Telephone, printing, postage, child safety seats, office supplies, computers and printers are examples of commodities.
3. Equipment - Cost of equipment provided for the contractor. Preliminary breath testers (PBTs), radar or lidar units and speed trailers are examples of equipment.
4. Contractual Services - Services for individual consultants or consulting firms engaged in performing special studies and gathering data pertaining to the program or project.

COMMITMENT STATEMENTS

If approved, your agency will commit to at least the first two statements in this section of the application. **Statement 1** is a commitment to conduct the program activities and provide the required reports in a timely manner as well as an annual report at the end of the program year. **Statement 2** is a commitment to submit claims for reimbursement on forms provided by the GTSB with an authorized original signature within 90 days of the claimed expenses being paid. **Statements 3-6** apply only to law enforcement agencies committing to conduct directed traffic enforcement, public education and safety belt surveys. **Statements 7 and 8** relate to obtaining prior approval for traffic safety messages to be printed on educational materials and for any out-of-state travel taken in support of the program. **Statement 9** is a commitment to provide an HSP-3 form and a digital photo of any equipment purchased under the program.

SIGNATURE(S)

The agency head or other suitable authority (Director, Chief, Sheriff,) must sign the completed funding proposal. Police departments must also obtain the signature of the mayor to demonstrate the community's support for the program.

For Further Information/Assistance,
please contact the Governor's Traffic Safety Bureau at
515-725-6121

**Applications Must be Received in the Bureau by the
LAST WEEK DAY IN FEBRUARY, CLOSE OF BUSINESS, 4:30 P.M.**

**Mail Application to:
Iowa Governor's Traffic Safety Bureau
215 East 7th Street, 3rd Floor
Des Moines, IA 50319-0248**

**The Bureau will accept a faxed version of your application; however,
the original signed application must then also be mailed to our office.**

Examples of Items Commonly Funded under the Section 402 Program

1. Overtime for educational presentations
2. Overtime for enforcement or dispatch services
3. Training-related travel
4. Educational materials (brochures, posters or other printed items with traffic safety information)
5. In-car video cameras
6. Radars, Lidars and TruCam (hand-held laser radar/video camera)
7. PBTs
8. Speed trailers (partial funding)
9. Fatal Vision Goggles

Examples of Items NOT Funded under the Section 402 Program

1. Research
2. Office furniture
3. Alcoholic beverages
4. Signs or roadway hardware
5. Benefits for working overtime
6. Vehicles (cars, motorcycles, boats)
7. Salary for existing personnel (considered supplanting)
8. Entertainment or refreshment (coffee, donuts) expenses
9. Any equipment ordered prior to the effective date of the contract
10. Any equipment received after the expiration date of the contract
11. Equipment to replace GTSB-funded equipment less than five years old

Iowa Governor's Traffic Safety Bureau

www.iowagtsb.org

Section 402 - State and Community Highway Safety Grant Application

Contract Period: October 1, 2016 through September 30, 2017

Agency _____	Contact _____ <i>Please provide both Name & Title</i>
Address _____ <i>Please provide the PO Box if you have one</i>	City/State/Zip _____
Phone/Fax _____	E-mail _____
Reimbursement checks made out to (county/city/agency): _____	
Address (if different from agency): _____	

Provide responses to the following on a separate sheet of paper (REQUIRED):


- 1) Problem Statement:** Briefly describe traffic safety problem(s) to be addressed. Include pertinent traffic data.
- 2) Goal Objectives/Performance Measures:** What results do you hope to attain and how they will be measured.
- 3) Proposed Activities:** Describe the methods by which you propose to achieve your objectives. (OT Enforcement, Educational presentations, Outreach, etc.)

Agency's Current Resources:

Personnel: Number of sworn officers _____ Average OT pay rate \$ _____

If equipment requested, an Equipment Information Form (back page) must be completed

Requested Program Elements (select one or more your agency can utilize) may be reduced if requests exceed existing funds

Personnel:	\$ Amt Requested	
_____ OT for traffic enforcement	\$ _____	 <i>Estimate # of hours officers will be able to conduct OT directed at high-risk times & locations & multiply by the</i>
_____ OT for educational presentations	\$ _____	
_____ Program training-related travel	\$ _____	
Commodities:		
_____ Traffic education print materials*	\$ _____	*Traffic safety educational print items (brochures/posters/coloring books) must provide traffic safety facts/guidelines to educate. No trinkets.
_____ Phone, postage, printing, supplies, software**	\$ _____	
_____	\$ _____	
_____	\$ _____	
Equipment:		**Detail the software and how it will be used and the benefit to the program.
_____ Radar handheld \$1000/moving \$1500	\$ _____	If program elements needed are not listed, use this space and/or an additional sheet to provide details.
_____ Lidar - laser radar \$3000 each	\$ _____	
_____ PBT(s) \$450 each	\$ _____	
_____ Speed trailer \$4500 partial pay	\$ _____	
_____ TruCam laser/video cam \$4500	\$ _____	
_____ In-car video camera \$4500 each	\$ _____	
_____ Other _____	\$ _____	
Contractual Services:		
_____ Consultant, software development, other program-related services	\$ _____	
_____ Other _____	\$ _____	
Total Funding Amount Requested		\$ _____

GTSB Section 402 - State and Community Highway Safety Grant Application - Page 2

Commitment Statements:

If approved, our agency commits to: **(Items 3-6 Apply ONLY to Law Enforcement Agencies)**

- 1) Conduct program activities within the time frame of the contract and submit a timely monthly or quarterly report and a final accumulative report on program activities, successes and/or failures;
- 2) Submit claims for reimbursement on GTSB provided forms with proper original signature within 90 days of expenses being paid.
- 3) Conduct traffic enforcement directed at alcohol/drug-related, occupant protection, speed, stop sign/stop light and other moving violations;
- 4) Conduct at least two special traffic enforcement projects such as saturation patrols or checkpoints with at least one project conducted during nighttime hours;
- 5) Conduct at least twelve public information/education activities;
- 6) Conduct and publicize results of 2 observational occupant protection surveys in March and August;
- 7) *If funding is received for educational materials*, traffic safety educational information will be pre-approved and printed on the materials to be distributed in support of the program.
- 8) *If funding is received for program-related travel*, a travel request will be submitted 8 weeks prior to out-of-state travel and a post-travel report submitted within 2 weeks of return.
- 9) *If funding is received for equipment*, it will be purchased to support the program and an HSP-3 form and a digital photograph of the equipment serial number will be submitted. If the equipment cost is \$5,000 or more (regardless of the reimbursement amount), special prior approval from NHTSA must be received.

Signature of Agency Head

Signature of Mayor (Police Depts Only)

Please **Type** Above Name

Please **Type** Above Name

NOTE: Section 402 Highway Safety Programs are funded with a one-year grant. No match required.

If you have any questions regarding the Section 402 Highway Safety Program Application Process, please contact the Bureau at 515-725-6123

Applications MUST be received in the GTSB office by February 29, 2016

Faxes will be accepted, but original signature applications must also be sent

FAX # 515-725-6133

GTSB Equipment Information Form

MUST Complete and Submit with Funding Application if Equipment is being Requested

Agency: _____
Please enter your agency's name in case this sheet gets separated from rest of your application

Number of Marked Vehicles in Department's Fleet: _____

Number of Unmarked Vehicles in Department's Fleet: _____

Number of Working Radars* Owned by Department: _____

Number of Working PBTs* Owned by Department: _____

Number of Working Lidars* Owned by Department: _____

Number of Working In-car Cameras Owned by Dept.: _____

***NHTSA/DPS Approved Equipment Lists on GTSB website www.iowagtsb.org. Not required for cameras.**

Is requested equipment to replace GTSB-funded equipment? Yes No

If yes, please list the equipment and the date of its purchase:

Equipment:

Date Purchased:

Is the equipment requested an upgrade of existing equipment? Yes No

If yes, give reason(s) why upgrade is needed: *Example: Upgrading from analog to digital.*

NHTSA Program Management R11/07 §18.32 Equipment...(c) Use. (1) Equipment shall be used by the grantee in the program for which it was acquired as long as needed, whether or not the project continues to be supported by Federal funds. When no longer needed for the original program, the equipment may be used in other activities currently or previously supported by a Federal agency. (2) The grantee shall also make equipment available for use on other projects currently or previously supported by the Federal Government, provided such use does not interfere with the project for which it was originally acquired. (3) The grantee must not use equipment to provide services for a fee unless specifically permitted by Federal statute. (4) When acquiring replacement equipment, the grantee may use the equipment to be replaced as a trade-in or sell the property and use the proceeds to offset the cost of the replacement property, subject to the approval of the awarding agency. (d) Management requirements. (1) Property records must be maintained that include a description of the property, a serial number or other ID number, the source of property, who holds title, the acquisition date, and the cost, percentage of Federal participation in the cost, the location, use and condition of the property and any ultimate disposition data including date of disposal and sale price of property. Equipment must be made available for a periodic GTSB inspection. (2) A physical inventory of the property must be taken and the result reconciled with the property records at least once every two years. (3) A control system must be developed to ensure adequate safeguards to prevent loss, damage, or theft of the property. Any loss, damage or theft shall be investigated. (4) Adequate maintenance procedures must be developed to keep the property in good condition. (e) Disposition. GTSB Form 79 must be submitted when disposing funded items. Items of less than \$5,000 may be retained, sold or otherwise disposed of with no further obligation but to provide the awarding agency the disposition date. Before disposing items of \$5,000 or more, approval must be obtained.

Allowable 402 Equipment Includes: Hand-held radars (\$1,000); Moving radars (\$1,500); Lidars (\$3,000); PBT (\$450); in-car video system (\$4,500); speed trailer (\$4,500); Fatal Vision Goggle Kits (\$850); and software. DataMasters for the State Crime Lab only.

Equipment NOT Allowed: Office furniture; signs or roadway hardware, vehicles, equipment ordered prior to the effective date of the contract, equipment received after the expiration date of the contract, and any equipment to replace GTSB-funded equipment which is less than five years old.

